

STRUCTURE OF THE MICROCARD (BASIC INSTRUCTIONS)

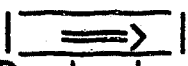
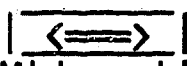
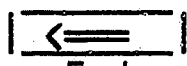
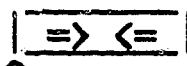
A02 = How to use the microcard		1	2	3		4
A01 = Structure of microcard					SIS	
B01 = Trouble-shooting chart	-A-	***X*	X*XXX	XXXXX	XXXXX	*XXXX X
	-B-	*XXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	-C-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	-D-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XXX
	-E-	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX XX
	-F-	XXXXX	XXXXX	XXXXX	XXX	
	-G-	XXXXX	XXXXX	XXXX		
	-H-					
	-J-					
	-K-					
	-L-					
	-M-					
N01 = Service Information	-N-	*XXXX	XXXXX	XXXXX	XXX	XX XX*
		12345	67890	12345	67890	12345 678
			1		2	

- Index
- N28 = Table of contents and publication information
- 1 = Special features
 - 2 = Safety and precautionary measures
 - 3 = Test equipment and tools
 - 4 = Installation position of components

- a. Read from left to right.
- b. Title of micropicture (appears on each coordinate).

E16	Product/component/test step	
	Coordinate	

c. Limits of section

			
Beginning	Mid-section	End	One-page section

A01		
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HOW TO USE THE MICROCARD

Trouble-shooting instructions for system:

Mono-Jetronic
Descriptions, photographs, terminal designations and special features refer to the following vehicle:

Fiat Regata 1.e
with 1.5 l / 4-cylinder engine 4.87 ->

These basic instructions constitute comprehensive trouble-shooting instructions. They must not be used as vehicle-specific instructions. Caution! Descriptions and photographs may deviate from the vehicle-specific brief instructions. Binding set values, terminal assignments and special features must be taken from the vehicle-specific brief instructions only. For brief instructions, see microcard KFZ-00..

SPECIAL FEATURES

- * Low-pressure fuel-injection system (approx.1 bar).
- * Fuel supply via low-pressure in-tank pump.
- * Throttle-body injection unit consisting of hydraulic section and throttle-valve section.
- * Pressure regulator integrated in hydraulic section.
- * Fuel induction through a solenoid-operated injection valve via the throttle valve.
- * Load detection by means of dual-operated potentiometer, via aperture angle of throttle valve.

A02		
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SPECIAL FEATURES (CONTINUED)

- * Safety circuit by way of pump relay driven by control unit.
- * Lambda sensor
- * Electric actuator with idle contact for engine-speed control
- * 25-pole control unit
- * Plausibility, i.e. if sensors are defective, a substitute value is made available from the control unit.
This applies to the following sensors: engine-temperature sensor, intake-air temperature sensor, idle and full-load switches.
- * For supplementary information on the system, see Service Information "New Mono-Jetronic System" microcard PKW-025, Coordinates D01-D11

In order to avoid damage to the throttle-body injection unit, pay attention to the following points.

- * Do not loosen screws of pressure regulator. Do not exert pressure on upper section, since this causes fuel pressure to change.
- * Do not turn stop screw (clamping stop) of throttle valve. Screw is permanently set and locked against rotation.
- * Do not actuate idle contact with throttle-valve deflected (part-load and full-load range). Throttle-valve idle adjuster could become blocked.
- * Do not adjust idle adjuster screw (at bottom of throttle-plate lever). Coordination of throttle-valve and idle adjuster is no longer guaranteed.

SPECIAL FEATURES (CONTINUED)

- * Do not adjust the throttle-valve potentiometer. It is not possible for After-sales service to test the relationship of the throttle-valve position (angle) to the setting of potentiometer.

Tank-ventilation system:

The fuel vapors which develop in the fuel tank are stored in an activated carbon filter. When the engine is running, the engine itself inducts the fuel vapors. A pulsed tank ventilation valve, which is installed between the activated carbon filter and the intake manifold, proportions the amount of fuel vapors delivered.

The variable on/off ratio is output by the control unit dependent upon the operating condition of the engine and thus determines the opening cross-section of the tank-ventilation valve. In this way, excessive changes in the mixture are avoided.

A second valve, the tank-ventilation switching valve, is connected in series with the pulsed tank-ventilation valve. This switching valve is opened during engine operation and closes immediately when the ignition is switched off. This is in order to prevent, for example, dieseling caused by the fuel vapors from the activated carbon filter.

SAFETY AND PRECAUTIONARY MEASURES

Always observe safety and precautionary measures in order to avoid hazards to persons and damage to the engine, the trigger box and control unit, and the ignition system.

CAUTION!

High-performance ignition system with dangerous high and low voltages!

Contact with voltage-carrying parts or terminals can be fatal (on both primary and secondary sides).

For testing of compressions pressure, disconnect pump relay in order to prevent undesired injecting of the injection valves.

Do not short-circuit ignition coil term. 1 to ground (e.g. for switching off the engine). Ignition coil and possibly control unit will be destroyed.

Never connect positive pole of battery to ignition coil term. 1. Control unit will be destroyed.

If installing an alarm system, follow installation instructions for L-Jetronic vehicles or SIS microcard PKW 012. Make sure that the alarm relay is not disturbed by external fields (e.g. from ignition leads), thus incorrectly triggering.

SAFETY AND PRECAUTIONARY MEASURES (continued)

Never start engine without battery being firmly connected (battery terminals bolted tight). Do not disconnect battery from the vehicle electrical system with the engine running.

Do not use a fast charger for starting the engine.

Render starting assistance only with a second 12 V battery and jumper cables.

Caution! Due to non-uniform requirements placed by vehicle manufacturers on electronic products, we do not recommend the use of 24 V batteries for starting assistance.

When charging the battery in the vehicle or rendering starting assistance, observe the directions given in the operating instructions of the fast charger as well as those provided by the vehicle manufacturer.

Prior to charging or fast-charging the battery, disconnect it from the vehicle electrical system.

Incorrect polarity of the supply voltage, e.g. due to incorrect connection of the battery or ignition coil, can lead to irreparable damage to a control unit.

Do not connect or disconnect the wiring harness from control units or trigger-box with the ignition switched on.

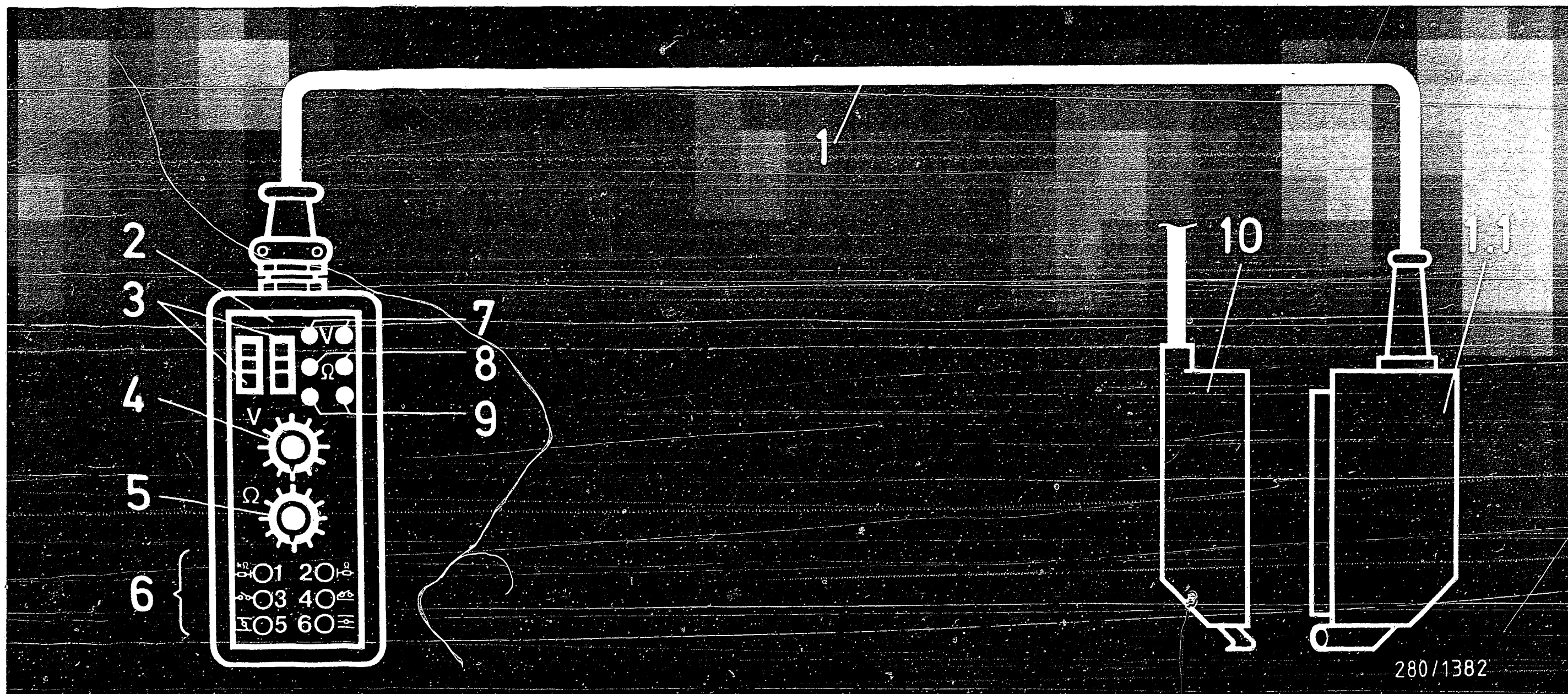
Prior to exposure to temperatures above +80°C (paint-dry installation) remove control units.

Control units must be removed before electric spot welding.

TEST EQUIPMENT AND TOOLS

Description	Designation	Part number
Universal test adapter	ETT 018.01	0 684 101 801
Adapter lead		1 684 463 170
Motortester	e.g. MOT 002.00	0 684 000 200
	MOT 300	0 684 000 300
	MOT 400	0 684 000 400
Test lead		KDUM 0008
		KDZS 0004
Exhaust-gas analyzer	e.g. ETT 008.00	0 684 100 800
Calibrated test equipment	ETT 008.04	0 684 100 804
	ETT 008.05	0 684 100 805
Pressure-measuring device e.g. manometer	Quality class 1.0	KDJE-P 100/17
Hose with union nut	Meas.range 1.6 bar	
Three-way line	Division 0.02 bar	KDJE-P 100/3
Both included in test kit		KDJE-P 100/13
		KDJE-K 100
Electrics tester or multimeter e.g.	ETE 014.00	0 684 101 400
	Philips	PM 2517 X
	Miselco	Master 50 K
	Fluke	Multimeter 23 or 75
Silicone grease for injection valve	Ft 2 v 1	5 700 080 125
Assembly paste for lambda sensor	VS 14016 Ft 120 g	5 964 080 112
	450 g	5 964 080 145
Spark gap	EFAW 1177 / 7	1 684 531 000
Sleeve-type suppressor		0 365 500 003
Temperature sensor		0 280 130 028
Press-in tool for injection valve		KDJE-7463

For production reasons:
continued on the following
coordinate.



280/1382

Universal test adapter with adapter lead

1 = Adapter lead (1 684 463 170)

1.1 = Connection to wiring harness
2 = Universal test adapter
(0 684 001 801)

3 = Test wells (for motortester)

4 = Program-selector switch "V"

5 = Program-selector switch "Ω"

6 = Keypad for simulation of operating states

Key 1 = NTC II (engine), cold (-20°C)

Key 2 = NTC II (engine), warm (+80°C)

Key 3 = Pump control

Key 4 = Tank-ventilation valve

Key 5 = Not used

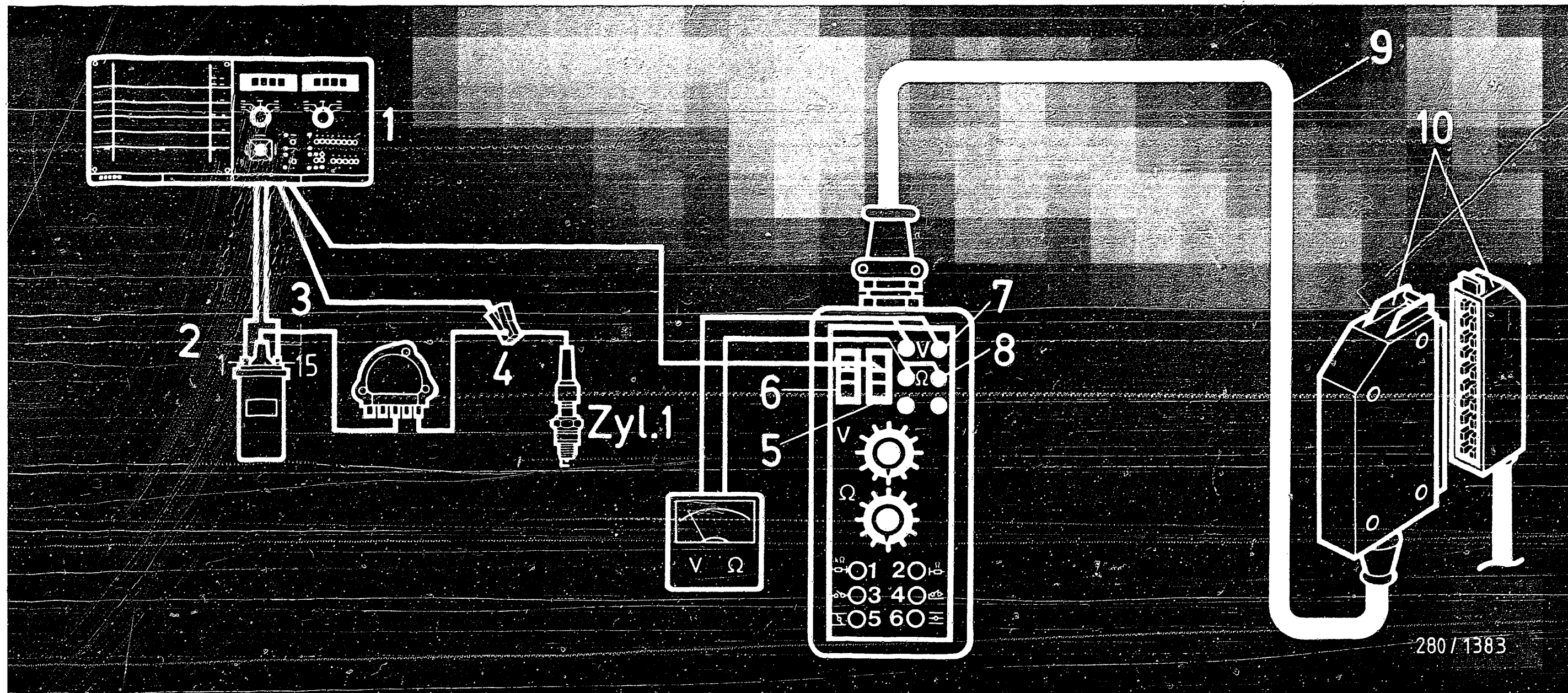
Key 6 = Not used

7 = Measuring sockets (volt. meas.)

8 = Measuring sockets (res. meas.)

9 = Only used with self-diagnosis

10 = Wiring harness

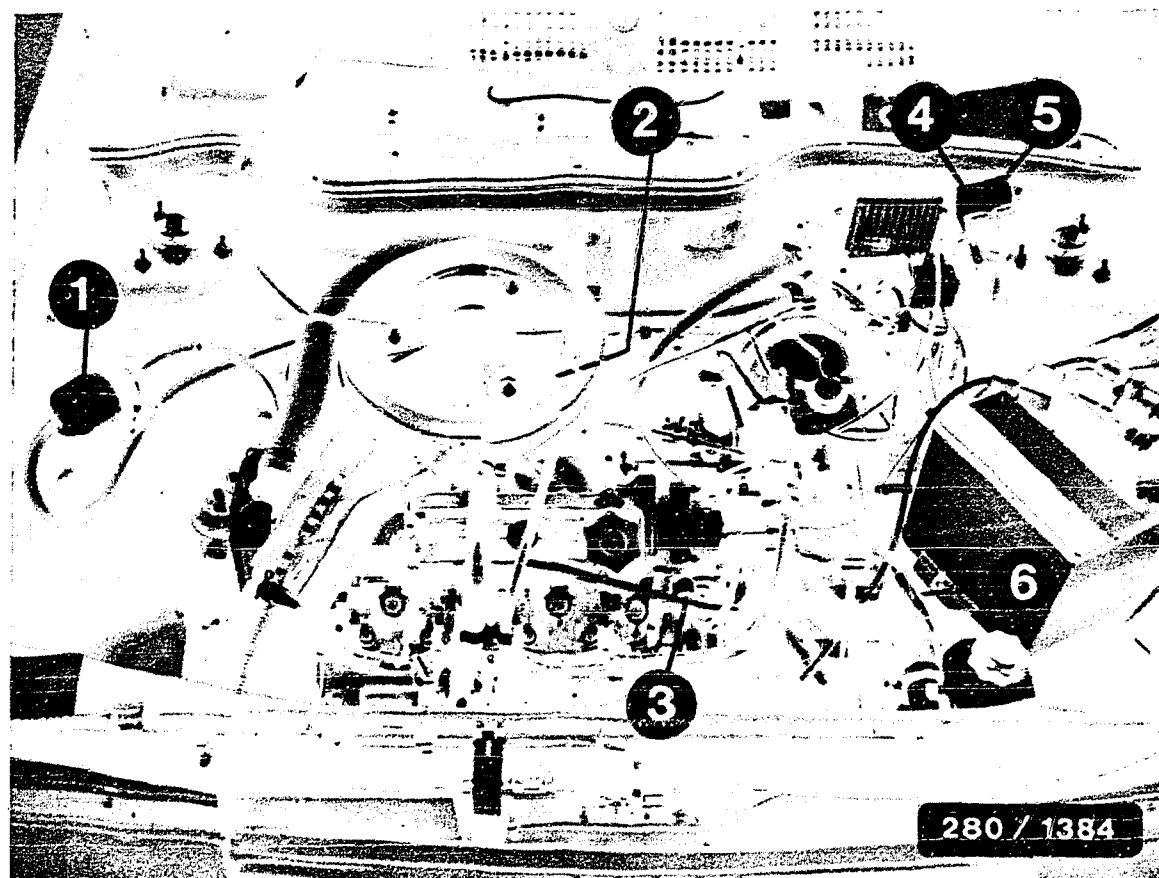


Terminal diagram for universal test adapter

3630D

- 1 = Motortester
- 2 = Green clip at ignition coil term.1
- 3 = Yellow clip at ignition coil term.15
- 4 = Clamp-on induction pickup via ignition cable of 1st cylinder
- 5 = Black connector bushing (test well) for black terminal of motortester
- 6 = Red connector bushing (test well) for red terminal of motortester

- 7 = Terminal of voltmeter at V sockets (red = +, black = ground or -)
- 8 = Terminal of ohmmeter at Ω sockets (blue)
- 9 = Adapter lead (1 684 463 170)
- 10 = Connection to wiring harness

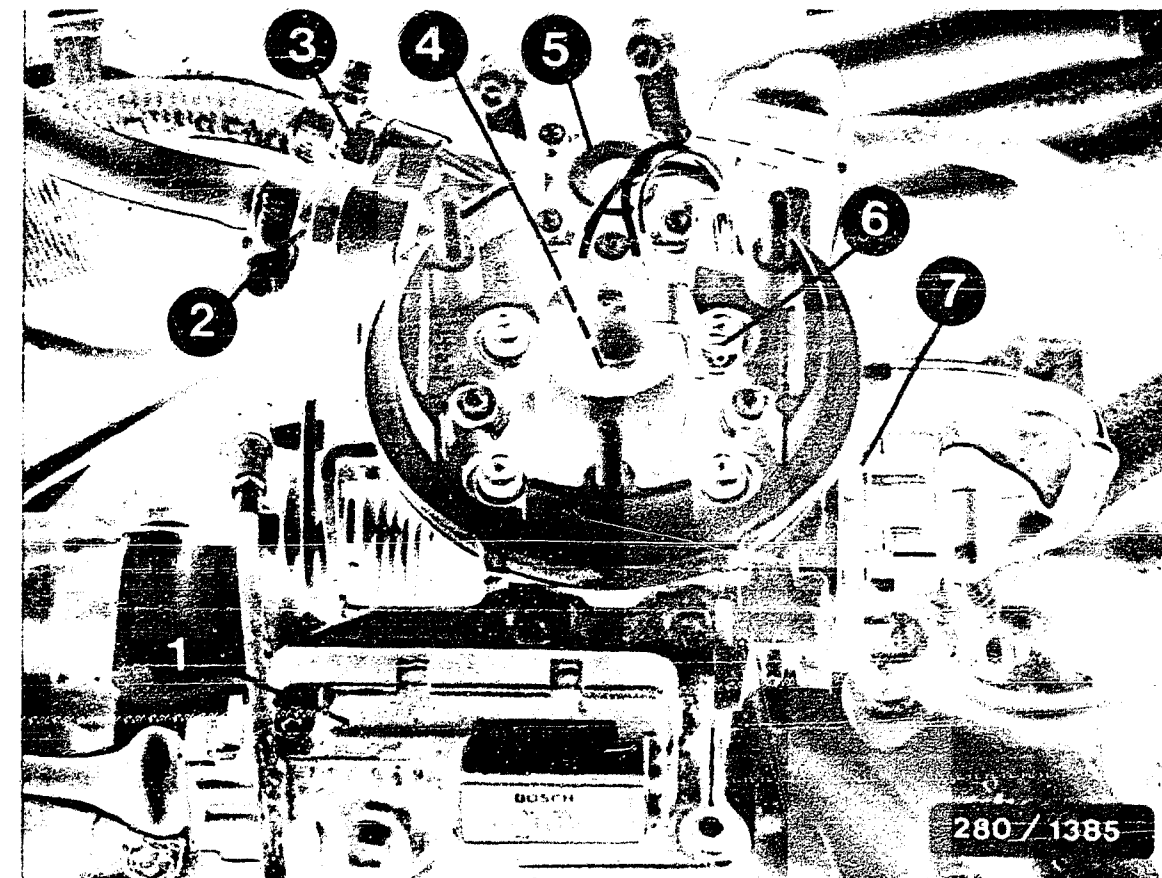


- 1 = Fuel filter
- 2 = Throttle-body injection unit
- 3 = Temperature sensor (engine)
- 4 = Main relay
- 5 = Pump relay
- 6 = Series resistor

INSTALLATION POSITION OF COMPONENTS

All details of installation positions are as viewed in the direction of travel.

Arrangement of components in the engine compartment.



- 1 = Throttle-valve idle adjustor
- 2 = Fuel return
- 3 = Fuel inlet
- 4 = Solenoid-operated injection valve
- 5 = Pressure regulator
- 6 = Intake-air temperature sensor
- 7 = Throttle-valve potentiometer

INSTALLATION POSITION OF COMPONENTS (CONT.)

25-pin control unit is usually accommodated in the passenger footwell, either above or behind the glove box.

The electric fuel pump, generally in the form of an in-tank pump, is combined with the tank indicator and is accessible via a plug above the fuel tank.

The lambda sensor is screwed into the exhaust pipe upstream of the catalytic converter.

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

Removing and installing the temperature sensor (intake air).

Removal:

Release torx screw on the connector of the solenoid-operated injection valve and carefully pull off connector upwards. Using a screwdriver, unlatch 4-pin plug from the hydraulic section and remove.

Installation:

If necessary, use new parts set 3 437 010 ..

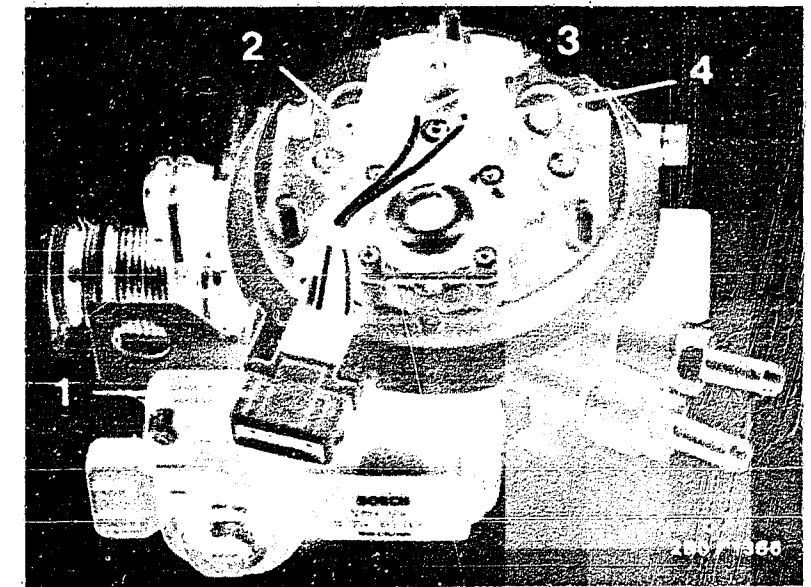
This contains the connector of the solenoid-operated injection valve with O-ring, temperature sensor (intake air), 4-pin plug and torx screw.

Insert 4-pin plug at hydraulic section and engage latching device correctly.

Position connector vertically and press down.

Caution, do not bend the pins of the injection valve.

Coat torx screw with small amount of screw-locking material (Loctite). Screw in torx screw, tightening torque 4...5 Nm.



- 1 = 4-pin plug
- 2 = Temperature sensor (intake air)
- 3 = Connector
- 4 = Torx screw

INSTALLATION POSITION OF COMPONENTS (CONTINUED)

Removal and installation of solenoid-operated injection valve.
It is necessary to remove and install the solenoid-operated injection valve for the following work:

- * Replacing solenoid-operated injection valve
- * Replacing hydraulic section (pressure regulator faulty).

Removal:

Reduce fuel pressure by releasing the inlet hose.
Collect any fuel flowing out.

Release torx screw on connector of the solenoid-operated injection valve and carefully pull off connector upwards.
Carefully lever out the solenoid-operated injection valve upwards with two pin punches (3 mm diameter) (see upper illustration).
Do not lever on one side only.
Take out solenoid-operated injection valve and lay down carefully.

Installation:

If the old valve is used again, use parts set no. 3 437 010 ...
This includes two O-rings for the solenoid-operated injection valve.

If installing a new valve, use a new parts set (for part number see service-parts microcard).
This includes a solenoid-operated injection valve with two O-rings.

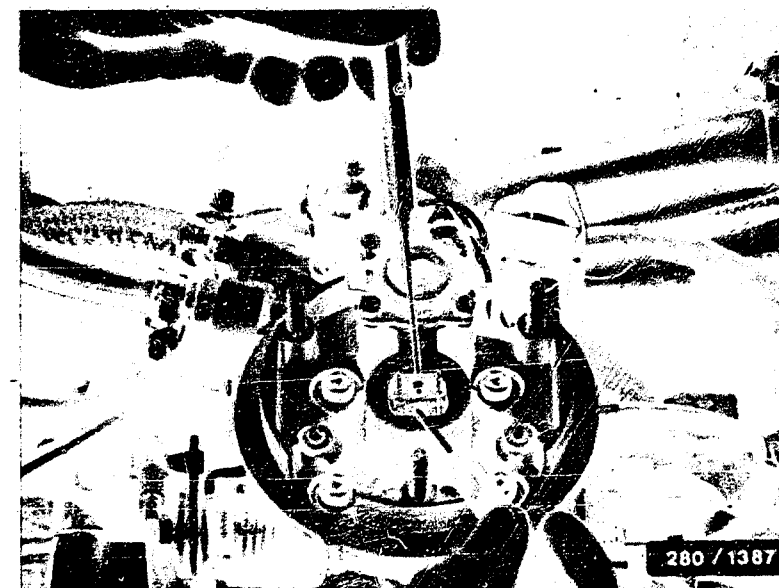
To ease installation, lightly wet O-rings with engine oil HD 30.
Pay attention to cleanliness.
Do not press in solenoid-operated injection valve with connector in position.

Insert solenoid-operated injection valve in the correct position in the valve seat and press in. Use tool KDJE-7463 (see lower illustration).

Mount connector vertically and press down.
Caution, do not bend pins of injection valve.

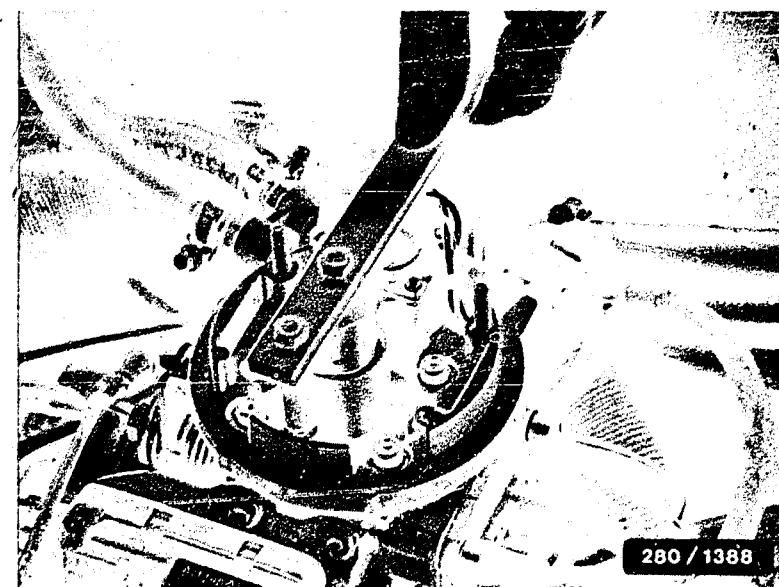
Coat torx screw with a small amount of screw-locking material (Loctite).
Screw in torx screw, tightening torque 4...5 Nm.

After installation, be sure to carry out leakage test of solenoid-operated injection valve. See Coordinate C25



Removal of solenoid-operated injection valve with pin punches (3 mm diameter)

Installation of solenoid-operated injection valve with press-in tool KDJE-7463



INSTALLATION POSITION OF COMPONENTS (CONTINUED)

Removal and installation of throttle-valve idle adjuster.
It is necessary to remove and install the throttle-valve idle adjuster for the following work:

- * Idle contact defective (replace throttle-valve idle adjuster)
- * Replace throttle-valve idle adjuster

Removal:

Detach connector on idle adjuster. Release torx screws and detach idle adjuster.

Installation:

Mount new idle adjuster and tighten torx screws; tightening torque 4...5,5 Nm.

Caution! For the protection of idle adjuster, do not insert connector.

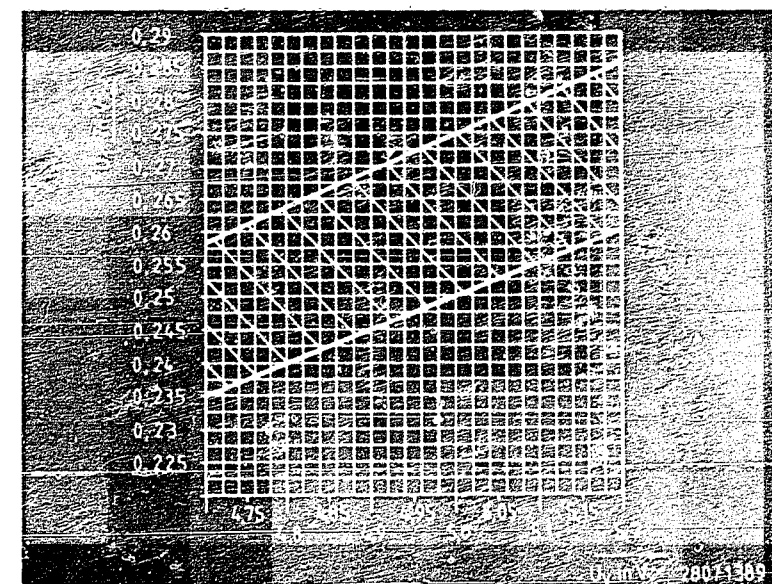
Following installation, check the allocation of the throttle valve to the position of the idle adjuster must be checked by voltage measurement.

Setting regulations:

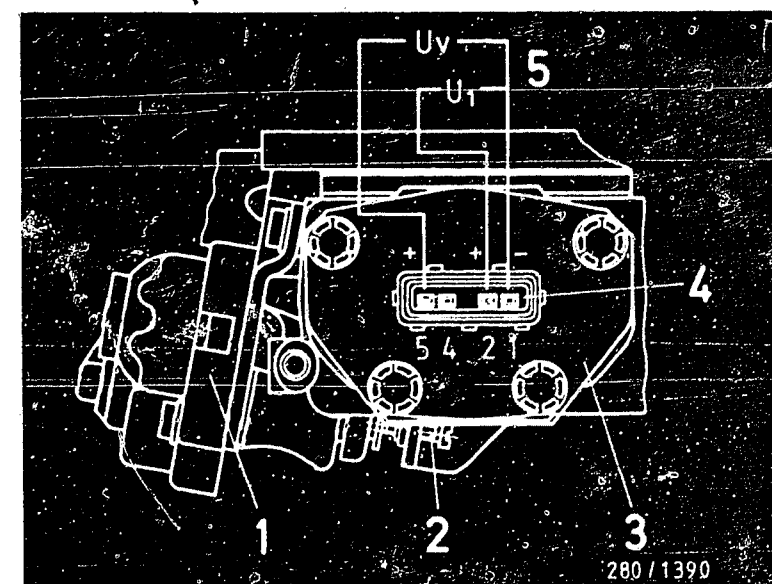
Caution! Do not turn the stop screw of the throttle valve.
Switch on ignition.

Use measuring leads KDZS 0004 for measurements.

1. Measure voltage U_v at term.5 (+) and term.1 (-) (to two decimal places). To do this, push back rubber sleeve on connector of throttle-valve potentiometer.
Make a note of the reading.
2. Measure voltage U_1 at term.2 (+) and term.1 (-) (to three decimal places). Make a note of the reading.
3. If U_1 is within the tolerance (see chart opposite) setting is completed. If not, continue as follows.
4. Remove sealing cap on idle-speed adjusting screw. By turning the screw, adjust U_1 until the voltage is within the tolerance.
5. Fit new sealing cap on idle-speed adjusting screw.
Insert connector in throttle-valve idle adjuster.
Push on rubber sleeve at throttle-valve potentiometer.
Run the engine.



- 1 = Idle adjuster
- 2 = Idle-speed adjusting screw
- 3 = Throttle-valve potentiometer
- 4 = Plug
- 5 = Voltage measurements for throttle-valve idle adjustment



INSTALLATION POSITION OF COMPONENTS (CONTINUED)

Removal and installation of throttle-body injection unit.

Removal:

Disassemble air filter.
Detach 3 multiple plugs.
Release and detach manifold-pressure hoses.
Release and detach fuel inlet and return hoses.
Disconnect throttle-valve cable or throttle linkage.
Release and remove four fixing screws.
Detach injection unit from intake manifold and set down carefully.
Be careful not to damage mounting face and idle adjuster.
Caution: Protect intake manifold from soiling.

Installation:

Place new seal (engine manufacturer) on intake-manifold mounting face.
Place injection unit in correct position on intake manifold.
Screw in 4 fixing screws; tightening torque 8...9 Nm.
Connect all hoses. Pay attention to leakages. Connect 3 multiple plugs.
Attach throttle-valve cable or throttle linkage.
Fix air filter in place.
Run the engine.

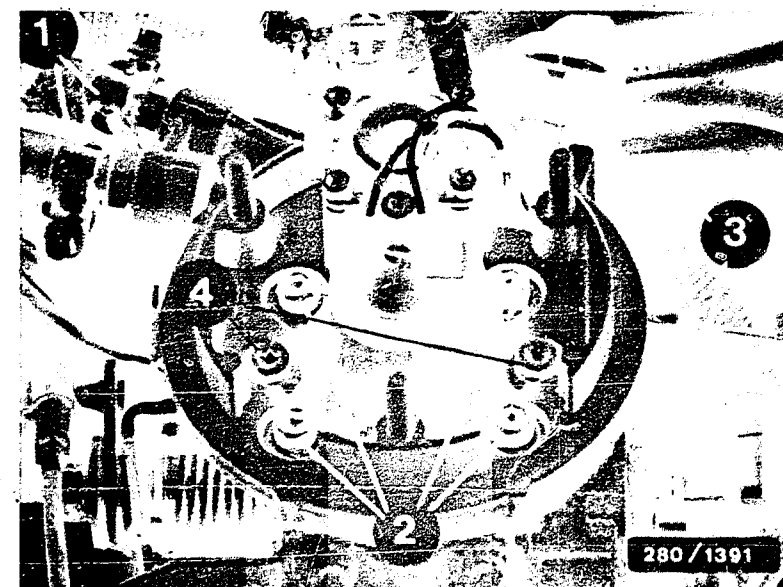
Removal and installation of hydraulic section.

Removal:

Remove air filter. Detach multiple plug.
Release and detach fuel inlet and return hoses.
Unscrew 2 connecting screws to throttle-valve section.
Release and remove 4 fixing screws.
Detach hydraulic section from throttle-valve section.
Be careful not to damage clamping surface and insulating seal.

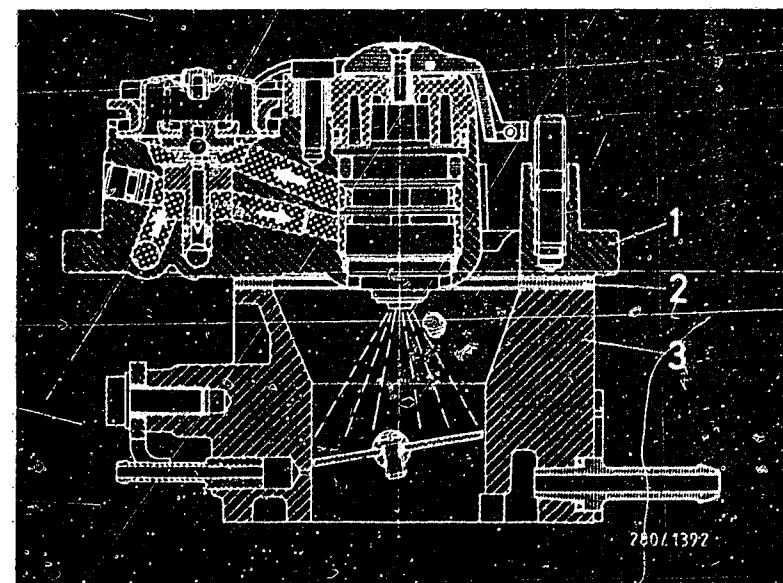
Installation:

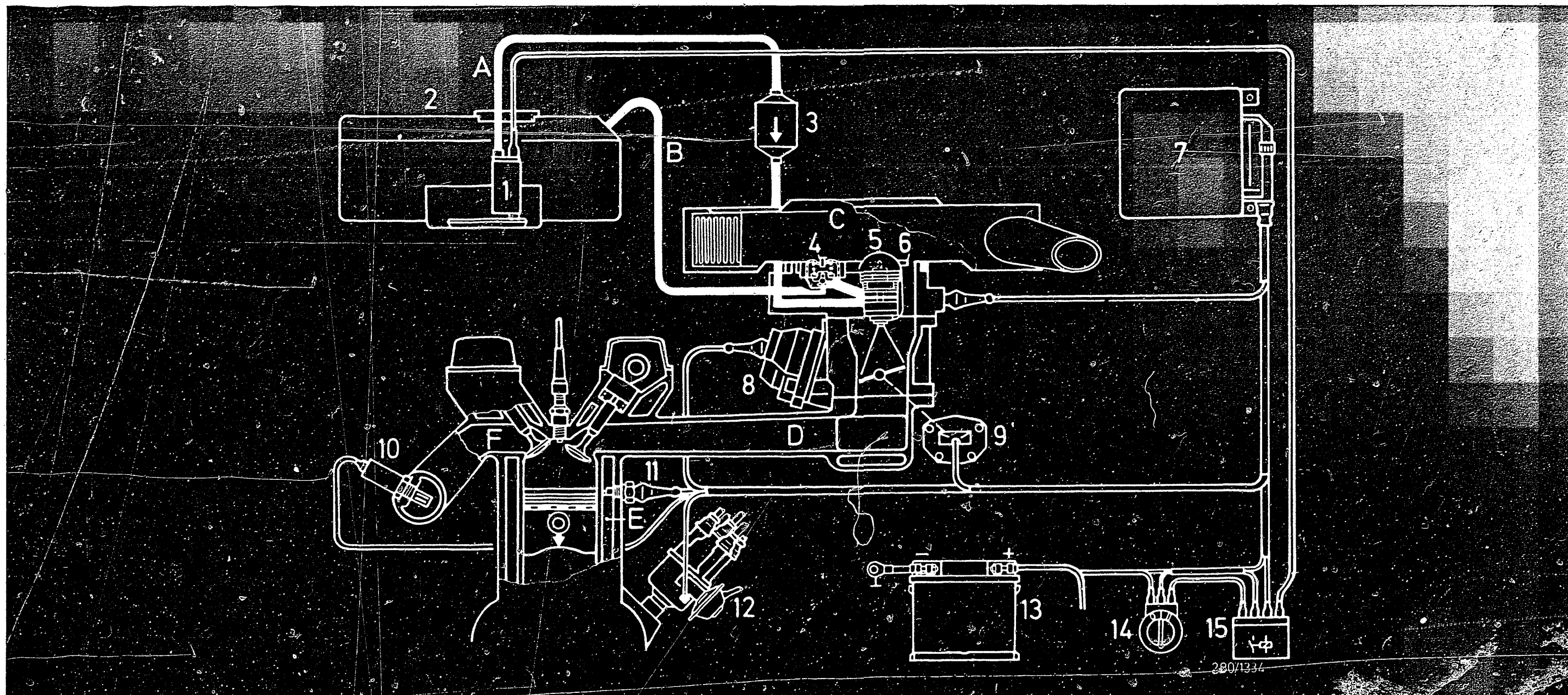
Place insulating seal in correct position on throttle-valve section.
Mount hydraulic section in correct position.
Clean 2 connecting screws and coat with a little screw-locking material (Loctite).
Screw in connecting screws; tightening torque 5.5...6.5 Nm.
Screw in 4 fixing screws; tightening torque 8...9 Nm.
Connect hoses and insert multiple plug.
Fix air filter in place and run the engine.



- 1 = Fuel inlet and return hoses
- 2 = 4 fixing screws
- 3 = Multiple plug
- 4 = Connecting screws

- 1 = Hydraulic section
- 2 = Insulating seal
- 3 = Throttle-valve section





- | | | |
|---|----------------------------------|--|
| 1 = Electric fuel pump | 7 = Control unit | 14 = Ignition and starting switch |
| 2 = Fuel tank | 8 = Idle adjuster | 15 = Relay (main relay and pump relay) |
| 3 = Fuel filter | 9 = Throttle-valve potentiometer | A = Fuel pressure |
| 4 = Pressure regulator | 10 = Lambda sensor | B = Return, pressureless |
| 5 = Solenoid-operated injection valve (minivalve) | 11 = Temperature sensor (engine) | C = Atmospheric pressure |
| 6 = Temperature sensor (intake air) | 12 = Ignition distributor | D = Pressure in intake manifold |
| | 13 = Battery | E = Coolant |

DIAGRAM OF AIR AND FUEL LINES

When trouble-shooting, it should be taken into account that additional systems or components such as brake servo-unit cylinders, central locking, tank ventilation or vacuum headlight-aim control may be connected to the intake manifold and thus represent additional sources of faults.

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM

The TROUBLE-SHOOTING CHART starts on coordinate B03 and contains customer complaints (fault symptoms) with several possible causes (component faults) in each case as well as coordinate references for detailed trouble-shooting. If no coordinate reference is given, this is a cause for which no test instructions are required.

Components that are checked by the self-diagnosis or with the universal test adapter are not listed in the trouble-shooting chart.

If the customer complaint is clear, proceed with trouble-shooting in the given order of possible causes one after the other and step by step.

Always start trouble-shooting with the self-diagnosis (if applicable) or with the universal test adapter (if provided). Only then continue with the trouble-shooting chart.

If the customer complaint is not clear, check all the causes listed in the trouble-shooting chart. To prevent possible incorrect measurements, check all causes in the order given (owing to the interlinking of test steps).

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM (continued)

The TROUBLE-SHOOTING PROGRAM contains all system and component checks mentioned in the trouble-shooting chart. It is divided into three rows of boxes.

The left-hand column contains test instructions and set values. The center column contains instructions on trouble-shooting and fault rectification. The right-hand column contains the illustrations/terminal diagrams belonging to the text, with explanations.

If the questions in the left-hand column can be answered conclusively with "yes", continue trouble-shooting with the next box down.

If the answer to the question is "no", branch to the center column and carry out the tests in the order given there. After rectifying a fault repeat the test as a check.

REQUIREMENTS FOR TESTING:

- Battery fully charged
- Engine in good mechanical condition (e.g. compression, valve clearance etc.)
- Engine at operating temperature, approx. +80°C (where necessary)
- Proper seating of all plug connections of wiring harness
- Ignition system O.K.

TROUBLE-SHOOTING CHART

Customer complaint (symptom of trouble)

1. Starting motor operates but engine fails to start or starts only with difficulty.
2. Engine starts but then dies.
3. Rough idling (Engine speed, exhaust gas).
4. Poor throttle response, flat spot during acceleration.
5. Engine misfiring (Ignition, injection).
6. Maximum engine power/top speed not reached.
7. Fuel consumption too high.
8. Engine running on (dieseling).
9. Engine pinging/knocking.
10. Engine overheating.
11. Fault lamp.

										Cause (component fault)	Coord.
*	*	*	*	*	*	*			*	Universal test adapter	B04
*	*	*	*		*					Air-intake system	C19
				*	*					Fuel quantity	C21
*	*	*	*		*	*	*			Fuel pressure, leakage	C23
		*		*	*	*	*			Solenoid-operated injection valve	D01
				*						Generator, interference suppression	D03
*	*	*				*				Start control	D05
				*		*				Overrun fuel cutoff	D09
		*	*	*		*				Engine-speed, CO adjustment	D13
		*	*	*		*				Lambda closed-loop control	D15
					*					Exhaust-gas catalytic converter	D19
		*	*			*				Tank ventilation	D21

B03

=> <=

HOW TO USE THE TEST CHART FOR THE UNIVERSAL TEST ADAPTER

- * Before testing, check all multiple plug-in connections for loose contacts.
- * Clean plug-in contacts if dirty or corroded.
- * Check for blade receptacles that have been pushed back. If necessary, bend back locking lug and press receptacle as far as it will go into plug housing; locking lug latches.
- * Suspicion of line breaks (positive and negative leads) in case of kinking and pinching.

Connect adapter lead.

The tests cover the peripherals and, where applicable, also the control unit. To take readings, connect to the universal test adapter a multimeter for voltage and resistance measurements and/or a motortester. The test must always be performed completely, starting at test step 1, in the order given.

TEST PROCEDURE:

1. The individual test steps build on one another.
Example: If, in one test step, the ground connection for the control unit is tested, this test is not repeated again in the further test steps.
2. If, in one test step, the set value is not obtained, this test step must be repeated after the fault has been rectified.

Note:

In the following test steps, the passages with an additional frame around them show which operation has to be changed compared with the preceeding test step.

B04

=> <=

Component/function:

Signal from term.1 or TD of ignition system. Energizing of control unit.

N>

* Operation:	Position
Prog.-sel.switch " V "	5
Prog.-sel.switch " Ω "	—
Test button	—

* Measuring equipment:
Ignition oscilloscope

* Measuring range:
Special input
Control lever, left-hand stop
Measuring range 20V

* Connection:
Test wells

* Operation in vehicle:
Ignition "on" and start

* Set values (reading):
Ignition pulses or rectangular pulses

Are pulses present?

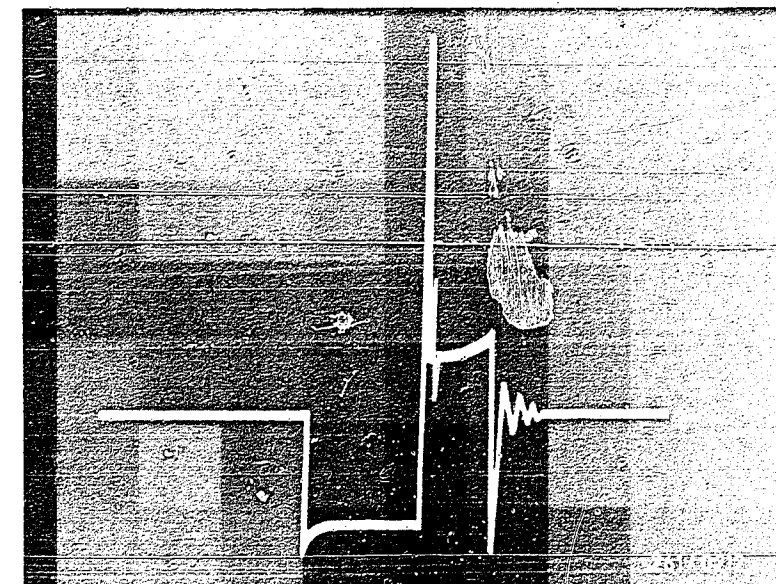
Trouble-shooting:

For testing, disconnect control-unit plug from test adapter.
Check the following leads for continuity with ohmmeter, Set value approx. 0 Ω :

- * From control-unit plug term. 1 to ignition coil term. 1
- * In case of TD signal, from control-unit plug term. 1 to ignition control unit.

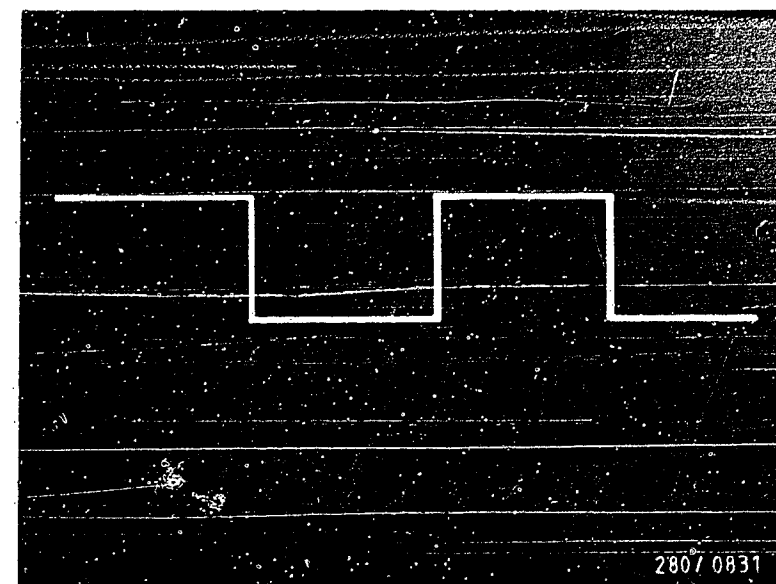
If leads O.K., check ignition system.

Eliminate open circuits/
contact resistances.



Term. 1 signal from term. 1
ignit. coil (primary signal)

TD signal from ignition
trigger box.



Continued on next picture page

Component/function:

Voltage supply to control unit (term.30)

N>

* Operation:	Position
Prog.-sel. switch " V "	6
Prog.-sel. switch " Ω "	—
Test button	—

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
approx. 20V

* Connection:
Red measuring socket (+)
Black measuring socket (-)

* Operation in vehicle:

* Set value (reading):
8...15 V

Measured value within
set-value tolerance?

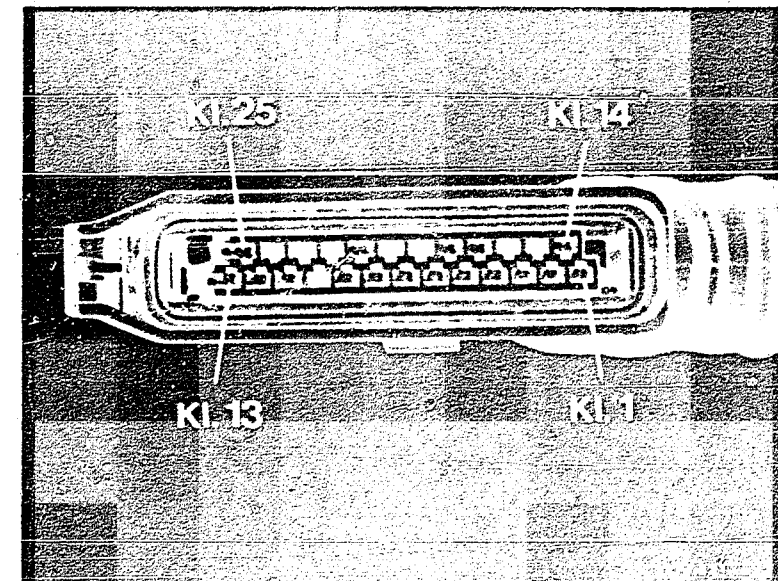
* Trouble-shooting:

For testing, detach control-unit plug from test adapter.

Check following lead with
with ohmmeter for
continuity,
set value approx. 0 Ω :

- * From control-unit plug
term.4 to battery (+).
- * From control-unit plug
term.5 to vehicle ground.

Eliminate open circuits/
contact resistances.



Top view of control-unit plug

Continued on next picture page

Component/function:

Voltage supply to the control unit (main relay).

N>

* Operation:	Position
Prog.-sel. switch " V "	7
Prog.-sel. switch " Ω "	—
Test button	—

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
approx. 20V

* Connection:
Red measuring socket (+)
Black measuring socket (-)

* Operation in vehicle:
Ignition "ON"

* Set value (reading):
8...15 V

Is measured value within
set-value tolerance?

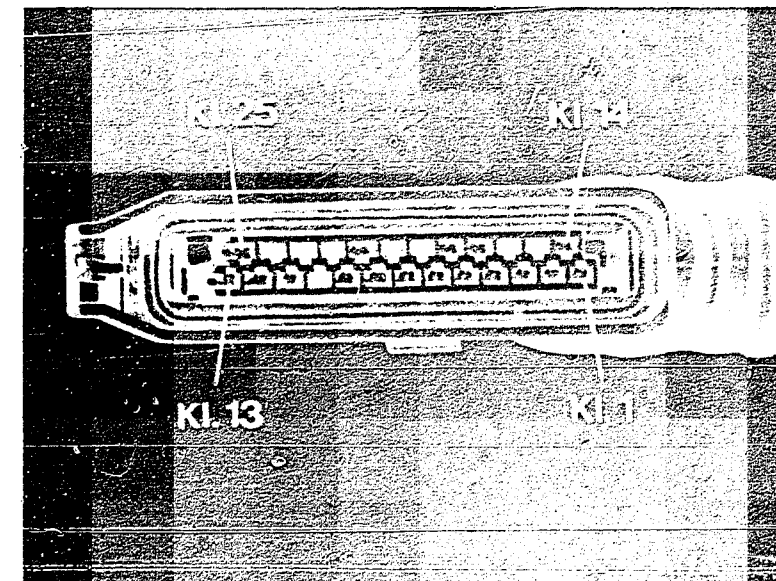
Trouble-shooting:

For testing, disconnect control-unit plug from test adapter. Remove main relay from plug-in base.

Check the following lead for continuity with ohmmeter, set value approx. 0 Ω :

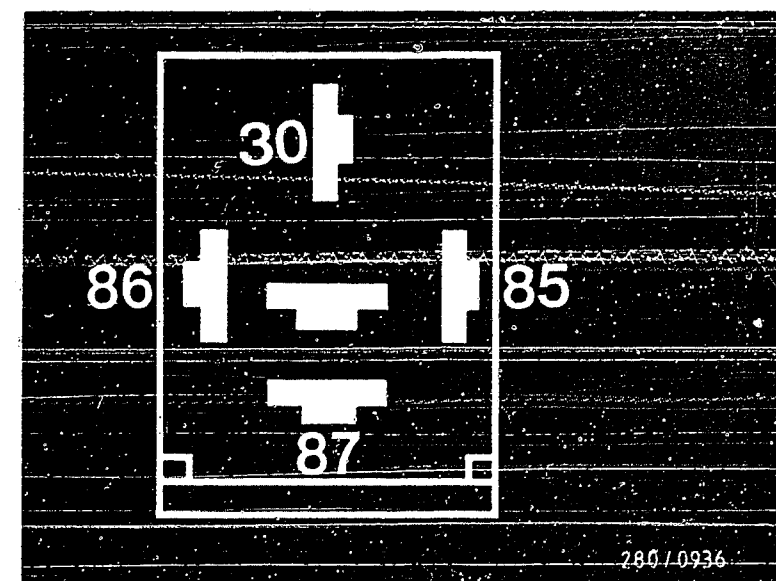
- * From control-unit plug term. 9 to main relay term. 87
- * Voltage supply at main relay term. 86 against term. 85
With ignition "on": 8...15V
If not, check lead term. 86 to term. 15 (ignition/starting switch) and ignition/starting switch.
- * Check lead term. 85 to vehicle ground.
- * Voltage at main relay term. 30 against term. 85: 8...15V
If not, check lead term. 30 to battery (+).
- * Connect main relay in plug-in base.
With ignition "on": relay must pull in.
If not => replace main relay.

Eliminate open circuits/
contact resistances.



Top view of control-unit plug

Top view of connection base.



Continued on next picture page

Component/function:
Simulation of energization
of electric fuel pump

N>

* Operation:	Position
Prog.-sel. switch " V "	8
Prog.-sel. switch " Ω "	—
Test button	3

* Measuring equipment:

* Measuring range:

* Connection:

* Operation in vehicle:
Ignition "ON"

* Set value (reading):
Electric fuel pump must operate,
check by listening.

Is electric fuel pump
running?

Trouble-shooting:

For testing, disconnect
control-unit plug from test
adapter.

Measure voltage at pump
relay term. 30 to vehicle
ground.

Set value: 8...15V

If not, check the following
leads for continuity with
ohmmeter

Set value approx. 0 Ω .

- * Check lead term. 30 from
pump relay to battery for
continuity.

If lead O.K. => replace
pump relay.

Measure voltage directly
at electric fuel pump.

Connect test adapter.

Press test button 3.

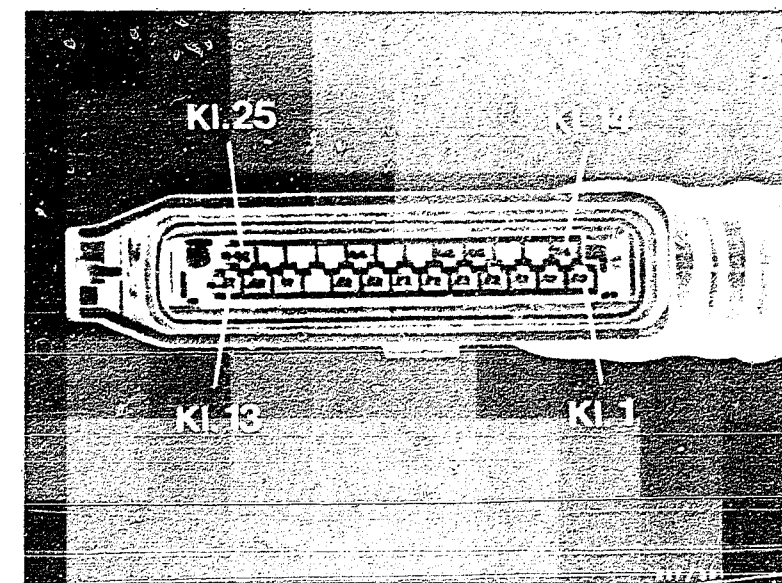
Set value: 8...15 V

If not, check the following
leads for continuity with
ohmmeter

Set value approx. 0 Ω .

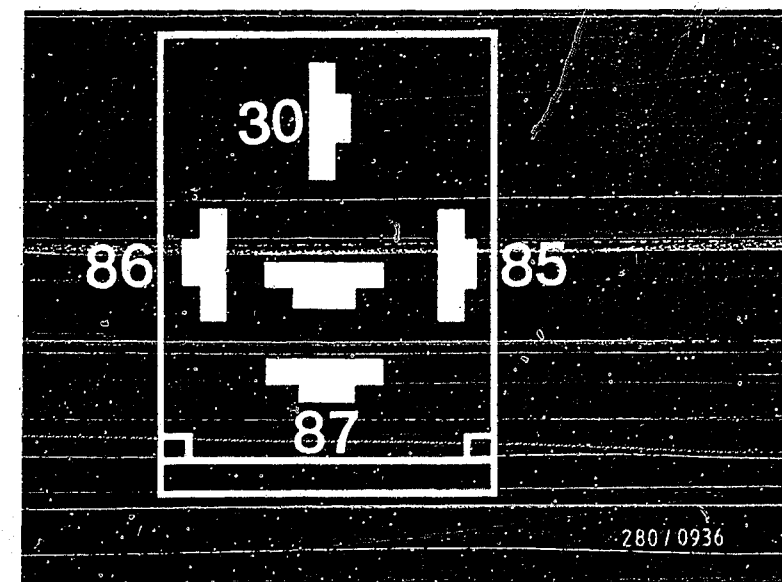
- * From electric fuel pump to
pump relay term. 87.
- * From electric fuel pump to
vehicle ground.

If leads O.K. => replace
electric fuel pump.



Top view of control-unit plug

Top view of connection
base.



Continued on next picture page

TEST STEP 5

(TEST SPECIFICATIONS AND NOTES ON OPERATION)

Component/function:

Winding and voltage supply
(+) to pump relay

N>

* Operation:	Position
Prog.-sel. switch " V "	8
Prog.-sel. switch " Ω "	—
Test button	—

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
approx. 20V

* Connection:
Red measuring socket (+)
Black measuring socket(-)

* Operation in vehicle:
Ignition "ON"

* Set value (reading):
8...15 V

Is measured value within
set-value tolerance?

Trouble-shooting:

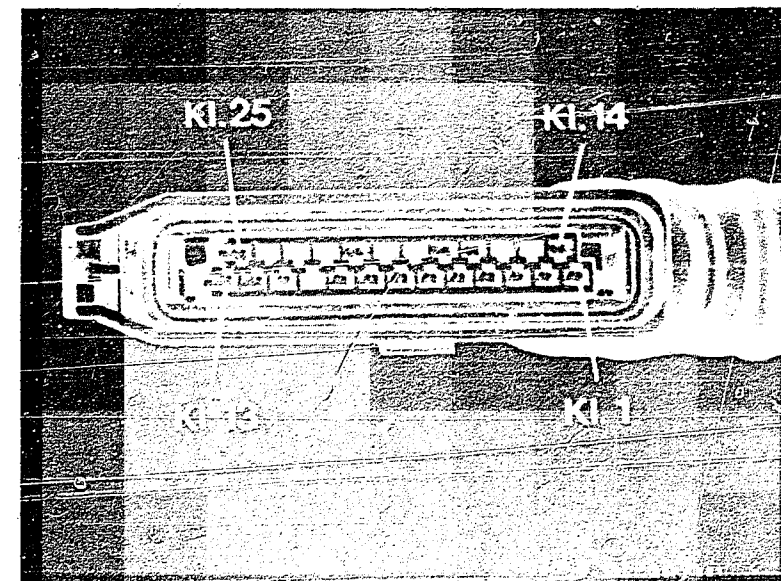
For testing, disconnect
control-unit plug from test
adapter.

Check the following leads
for continuity with ohmmeter,
Set value approx. 0 Ω :

- * From control-unit plug
term. 17 to pump relay
term. 85
- * From pump relay term. 86
to main relay term .87

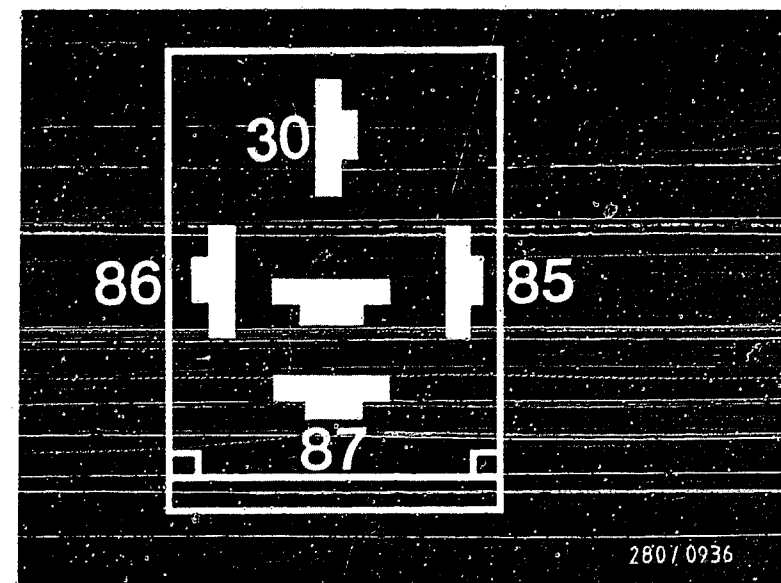
If leads O.K. => replace
pump relay.

Eliminate open circuits/
contact resistances.



Top view of control-unit plug

Top view of connection
base.



Continued on next picture page

Component/function:

Air conditioning ready for operation (if fitted)

N>

* Operation:	Position
Prog.-sel. switch " V "	9
Prog.-sel. switch " Ω "	—
Test button	—

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
approx. 20V

* Connection:
Red measuring socket (+)
Black measuring socket (-)

* Operation in vehicle:
Ignition "ON"
Switch on air conditioner

* Set value (reading):
8...15 V

Is measured value within set-value tolerance?

Trouble-shooting:

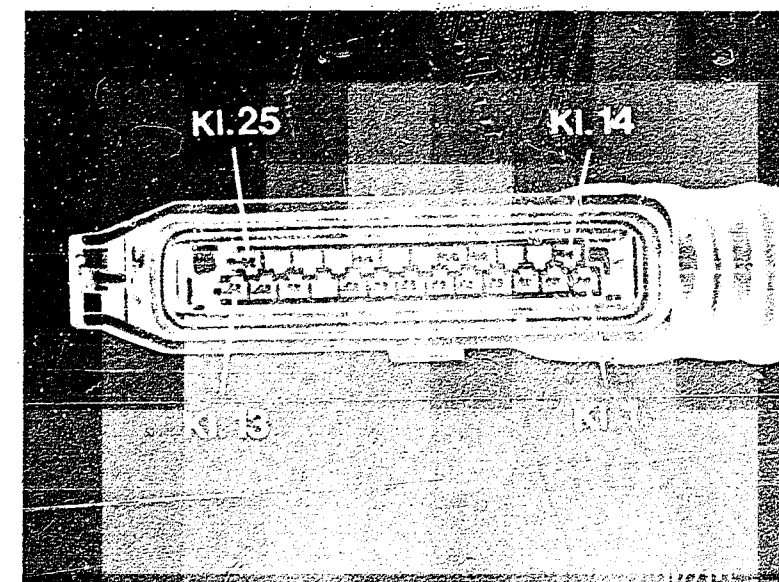
For testing, detach control-unit plug from test adapter.

Check following lines for continuity with ohmmeter,
set value 0 Ω :

+ From control-unit plug term 15
to air-conditioner switch.

If leads are O.K, check air-conditioner switch.

Eliminate open circuits/
contact resistances.



Top view of control-unit plug

Continued on next picture page

Component/function:Air-conditioner compressor
(if fitted)

N>

* Operation:	Position
Prog.-sel. switch " V "	10
Prog.-sel. switch " Ω "	—
Test button	—

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
approx. 20V

* Connection:
Red measuring socket (+)
Black measuring socket (-)

* Operation in vehicle:
Ignition "ON"
Switch on air-conditioner

* Set value (reading):
8...15 V

Is measured value within
set-value tolerance?

Trouble-shooting:

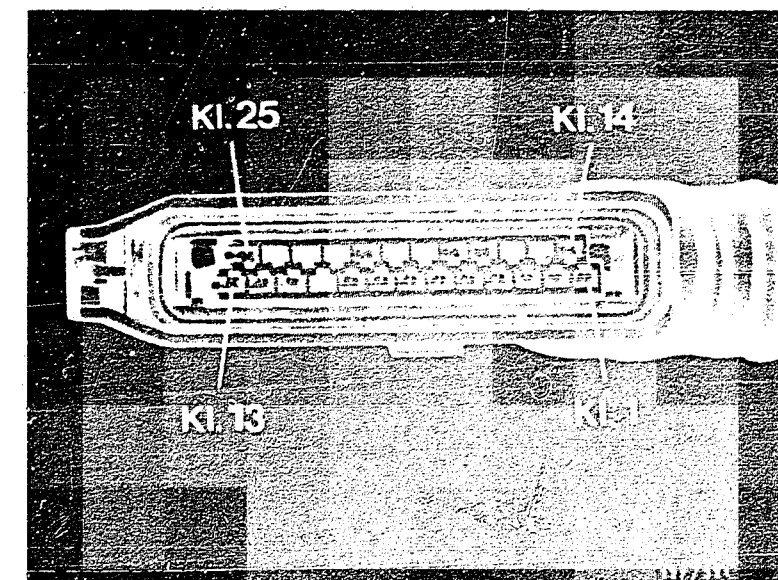
For testing, detach control-unit plug from test adapter.

Check following leads for continuity with ohmmeter,
set value 0 Ω :

- * From control-unit plug term. 16 to air-condition compressor.

If leads are O.K., check compressor switch.

Eliminate open circuits/
contact resistances.



Top view of control-unit plug

Continued on next picture page

Component/function:

Tank-ventilation valve
(if fitted)

N>

* Operation:	Position
Prog.-sel. switch " V "	12
Prog.-sel. switch " Ω "	—
Test button	4

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
approx. 20V

* Connection:
Red measuring socket (+)
Black measuring socket (-)

* Operation in vehicle:
Ignition "ON"

* Set value (reading):
Tank-ventilation valve must
respond, check by listening

Is measured value within
set-value tolerance?

Trouble-shooting:

For testing, detach control-unit plug from test adapter.

Measure resistance value
directly at tank-ventilation valve.

If set value is not reached,
replace tank-ventilation valve.

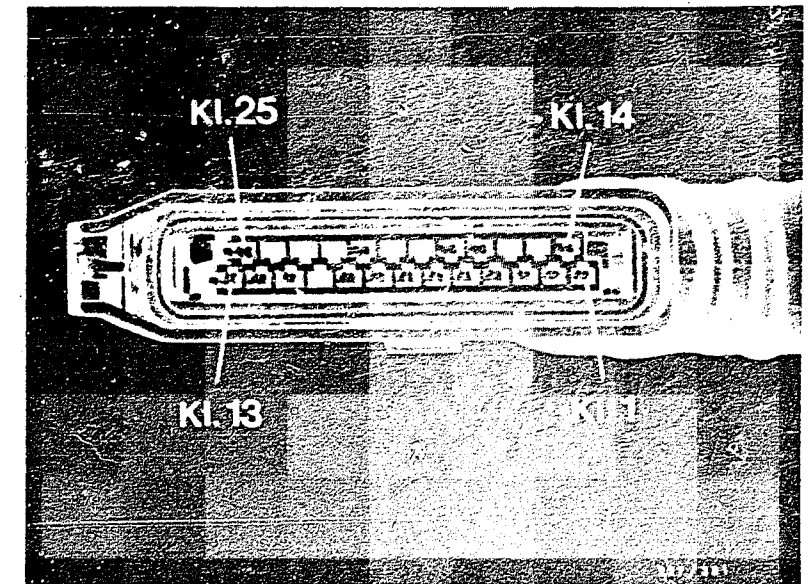
Check following leads for
continuity with ohmmeter.

Set value approx. 0 Ω :

- + From control-unit plug
to term.12 to tank-ventilation
valve.
- + From tank-ventilation vlv. to ign-
ition and starting switch term.15

If leads are O.K., replace
tank ventilation valve.

Eliminate open circuits/ contact
resistances.



Top view of control-unit plug

Continued on next picture page

Component/function:

Spark-advance valve (if fitted)

N>

* Operation:	Position
Prog.-sel. switch " V "	13
Prog.-sel. switch " Ω "	—
Test button	—

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
approx. 20V

* Connection:
Red measuring socket (+)
Black measuring socket (-)

* Operation in vehicle:
Ignition "ON"
Depress accel. pedal slightly

* Set value (reading):
8...15 V

Is measured value within
set-value tolerance?

Trouble-shooting:

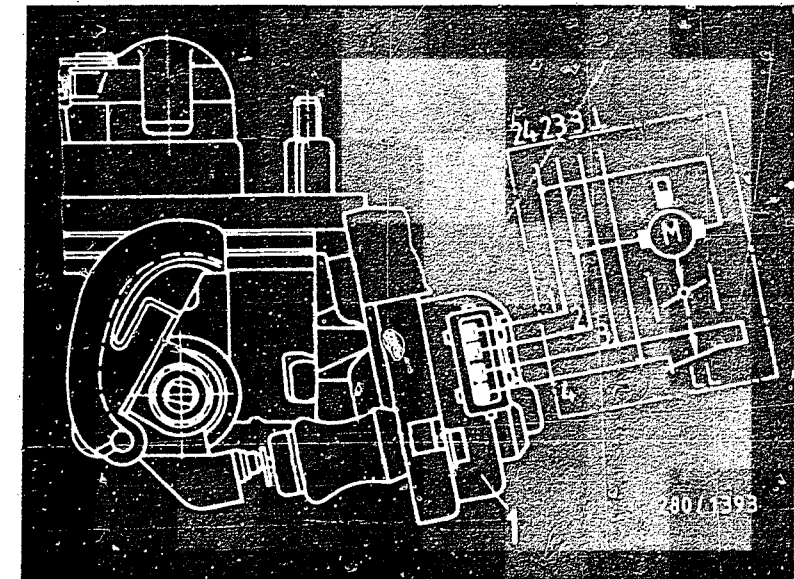
Detach control-unit plug from test adapter.

Check following leads for continuity with ohmmeter,
set value approx. 0 Ω :

- * From spark-advance valve to idle switch term.3
- * From spark-advance valve to ignition and starting switch term.15

If leads are O.K., replace spark-advance valve.

Eliminate open circuits/
contact resistances.



1 = Throttle-valve idle
adjuster

Continued on next picture page

Component/function:
Diagnostic display (if
fitted)

N>

* Operation:	Position
Prog.-sel. switch " V "	⇒
Prog.-sel. switch " Ω "	5
Test button	1

* Measuring equipment:

* Measuring range:

* Connection:

* Operation in vehicle:
Ignition "on"

* Set value (reading):
Diagnostic lamp lights up

Is measured within set-
value tolerance?

Y

V

Continued on next picture page

Trouble-shooting:

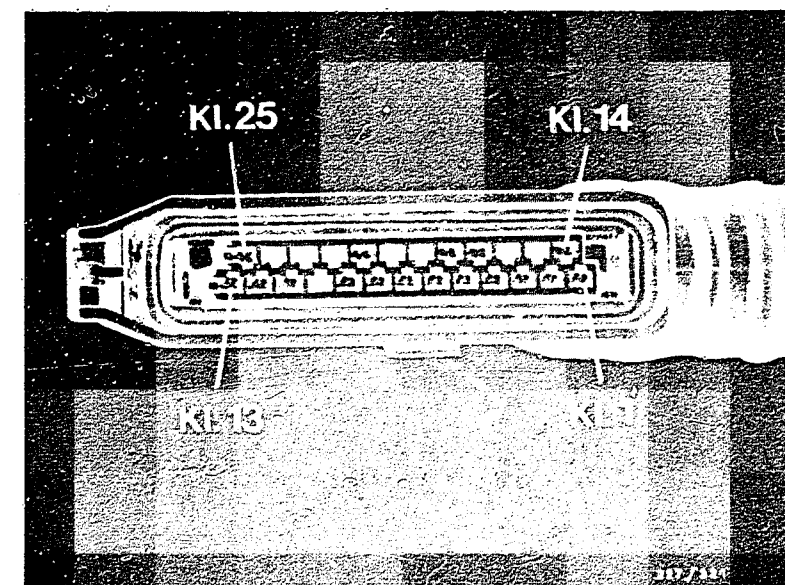
For testing, detach control-
unit plug from test
adapter.

Check following lead for
continuity with ohmmeter,
set value 0 Ω :

- * From control-unit plug
term.22 to diagnostic lamp
- * From diagnostic lamp to
ignition and starting
switch term.15

If leads are O.K., replace
diagnostic lamp.

Eliminate open circuits/
contact resistances.



Top view of control-unit plug

Component/function:
Resistance of idle
contact.

N>

* Operation:	Position
Prog.-sel. switch " V "	==>
Prog.-sel. switch " Ω "	7
Test button	—

* Measuring equipment
Motortester or multi-
meter

* Measuring range:
x 10 Ω

* Connection:
Measuring sockets, ohms,
blue

* Operation in vehicle:
Accel. pedal at idle

* Set value:
0...10 Ω

* Operation in vehicle:
Depress acc. pedal slightly

* Set value:
infinite Ω

Is measured value within
set-value tolerance?

* Trouble-shooting:
Requirement: throttle valve
is correctly adjusted.
Adjustment has been carried
out in the factory, the
adjusting screw is locked to
prevent turning.
Accelerator cable or linkage
adjusted to be free of tension.
If kinked, replace.

For testing, detach control-
unit plug from test
adapter.

Connect ohmmeter to plug of
idle adjuster at term.3 and
term.4. Accelerator cable
at idle position

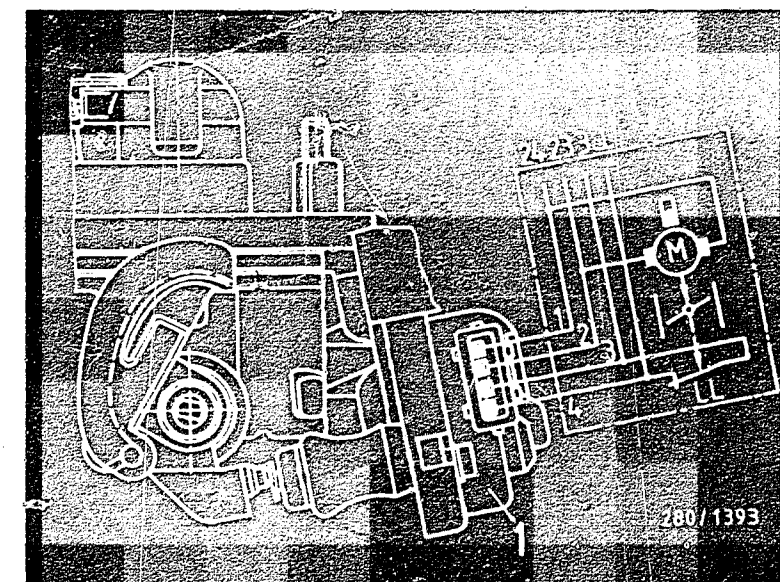
Set value approx. 0 Ω
Tighten accelerator cable
slightly.

Reading: infinite Ω.
If not, replace throttle-
valve idle adjuster.
See Coordinate A19

Check following leads for
continuity with ohmmeter,
set value approx. 0 Ω :

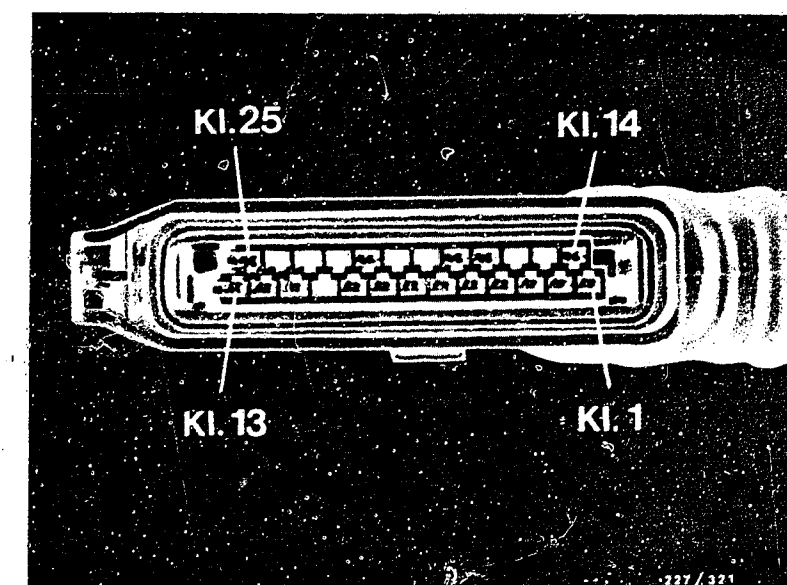
- * From idle contact term.3
to control-unit plug term.3
- * From idle contact term.4
to vehicle ground.

Eliminate open circuits/
contact resistances.



1 = Throttle-valve idle
adjuster

Top view of control-unit plug



Continued on next picture page

Component/function:

Functioning of transmission switch (if fitted)

N>

* Operation:	Position
Prog.-sel. switch " V "	==>
Prog.-sel. switch " Ω "	8
Test button	—

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
x 10 Ω

* Connection:
Measuring socket, ohms, blue

* Operation in vehicle:
Ignition "OFF" and gear engaged.

* Set value (reading):
0...10 Ω

Is measured value within set-value tolerance?

Trouble-shooting:

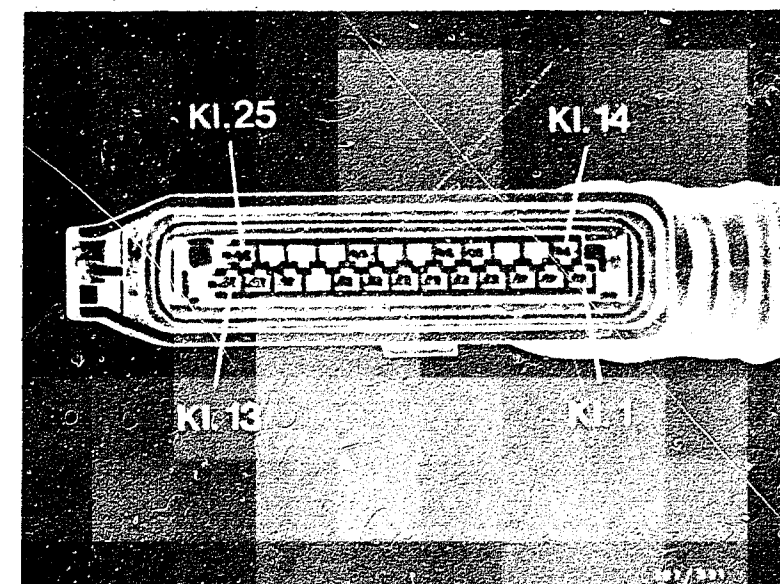
For testing, detach control-unit plug.

Check following lead for continuity with ohmmeter, set value approx. 0 Ω :

- * From control-unit plug term.6 to transmission switch
- * From transmission switch to vehicle ground.

If leads are O.K., replace transmission switch.

Eliminate open circuits/contact resistances.



Top view of control-unit plug

Continued on next picture page

TEST STEP 13

(TEST SPECIFICATIONS AND NOTES ON OPERATION)

Component/function:Connection of t v coding
(if fitted)

N>

* Operation:	Position
Prog.-sel. switch " V "	=>
Prog.-sel. switch " Ω "	9
Test button	—

* Measuring equipment:
Motortester or multi-meter

* Measuring range:
x 10 Ω

* Connection:
Measuring socket Ω blue

* Operation in vehicle:
Connect lead from term.10
to ground.

* Set value (reading):
0...10 Ω

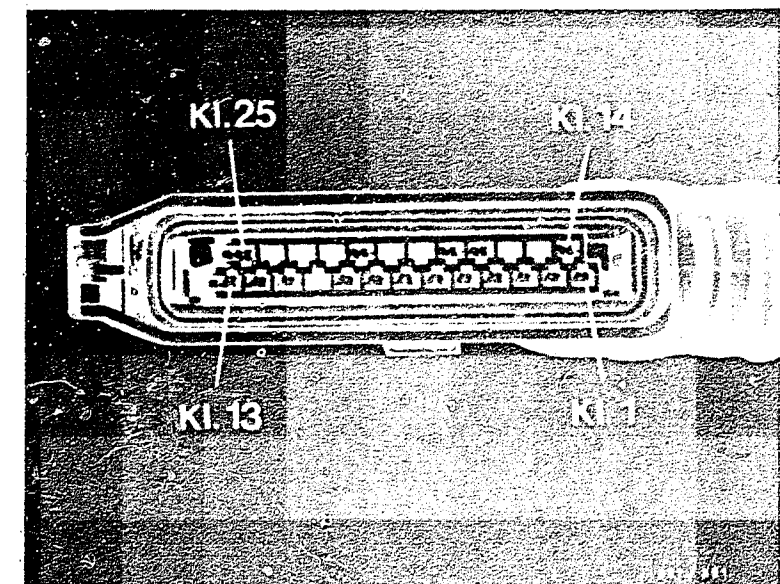
Is measured value within
set-value tolerance?

Trouble-shooting:For testing, detach
control-unit plug.

Check following lead
for continuity with
ohmmeter,
set value approx. 0 Ω :

* From control-unit plug
term.10 to end of lead

Eliminate open circuits/
contact resistances.



Top view of control-unit plug

Continued on next picture page

Component/function:Connection of pump coding
(if applicable)

N>

* Operation:	Position
Prog.-sel. switch " V "	==>
Prog.-sel. switch " Ω "	10
Test button	—

* Measuring equipment:
Motortester or multimeter

* Measuring range:
x 10 Ω

* Connection:
Measuring socket, ohms, blue

* Operation in vehicle:
Connect lead from term.11
to ground.

* Set value (reading):
0...10 Ω

Is measured within set-
value tolerance?Trouble-shooting:For testing, detach
control-unit plug.Check following lead
for continuity with
ohmmeter,
set value approx. 0 Ω :

* From control-unit plug
term.11 to end of lead

Eliminate open circuits/
contact resistances.

Continued on next picture page

Component/function:Resistance of temperature
sensor (intake air)

N>

* Operation:	Position
Prog.-sel. switch " V "	=>
Prog.-sel. switch " Ω "	11
Test button	—

* Measuring equipment
Motortester or multi-
meter

* Measuring range:
approx. 5k Ω or, 500 Ω

* Connection:
Measuring sockets, ohms, blue

* Operation in vehicle:
not applicable

* Set value:
At ambient temperature
+15°...+30°C:
1.45...3.3 k Ω

With warmed-up engine
approx. +80° C:
280...360 Ω

Is measured value within set-
value tolerance?

Trouble-shooting:

For testing, detach
control-unit plug from
test adapter.

Measure resistance value
directly at temperature
sensor (intake air).

Set value:

Ambient temperature
+15°...30°C:

1.45...3.3 k Ω

Warmed-up engine

approx. +80°C:

280...360 Ω

If set values are not
attained, replace temperature
sensor.

Refer to Coordinate A15

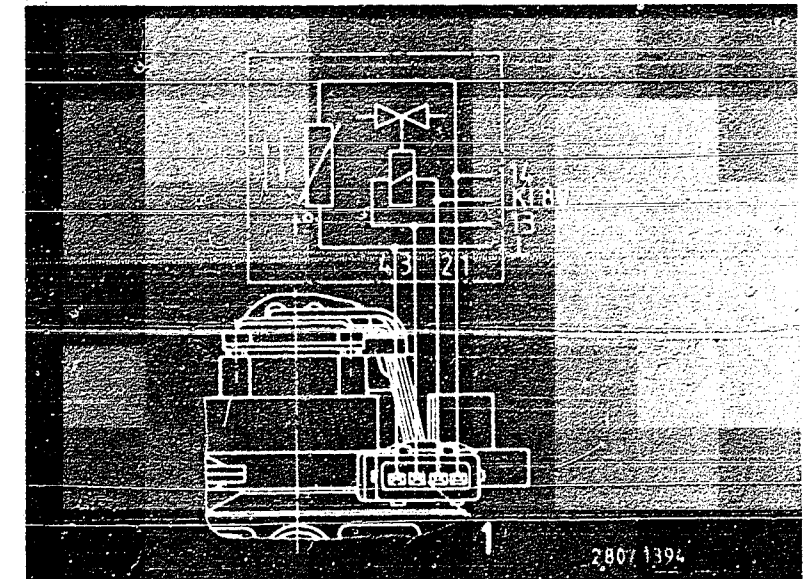
Check following leads
for continuity with
ohmmeter,

set value approx. 0 Ω :

* From control-unit plug
term.14 to temperature sensor
(intake air)

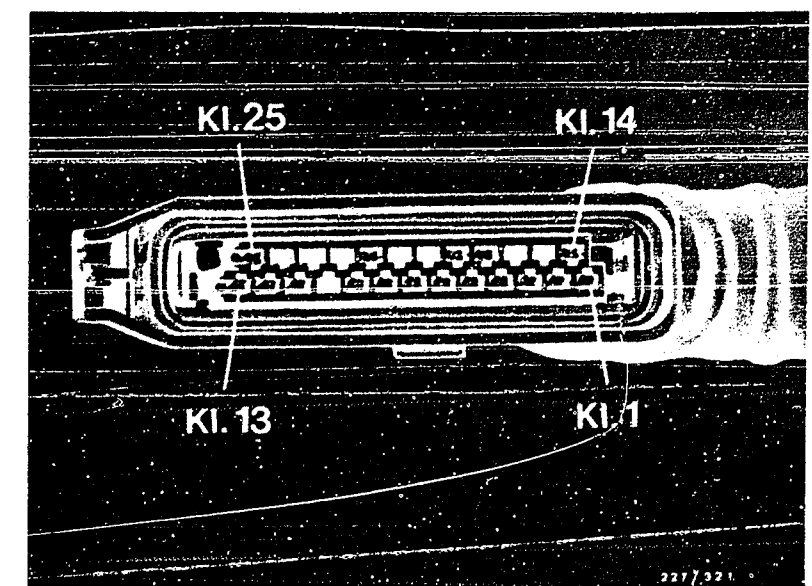
* From temperature sensor
(intake air) to vehicle
ground.

Eliminate open circuits/
contact resistances.



1 = Multiple plug of solenoid-
operated injection valve
and temperature sensor
(intake air)

Top view of control-unit plug



Continued on next picture page

Component/function:

Resistance of temperature sensor (engine)

N>

* Operation:	Position
Prog.-sel. switch " V "	=>
Prog.-sel. switch " Ω "	12
Test button	—

* Measuring equipment
Motortester or multi-meter

* Measuring range:
approx. 5k Ω or 500 Ω

* Connection:
Measuring sockets, ohms, blue

* Operation in vehicle:
not applicable

* Set value:
At ambient temperature
+15°...+30°C:
1.45...3.3 k Ω

With warmed-up engine
approx. +80° C:
280...360 Ω

Is measured value within set-value tolerance?

Trouble-shooting:

For testing, detach control-unit plug from test adapter.

Measure resistance value directly at temperature sensor (engine).

Set value:

Ambient temperature
+15°...30°C:

1.45...3.3 k Ω

Warmed-up engine

approx. +80°C:

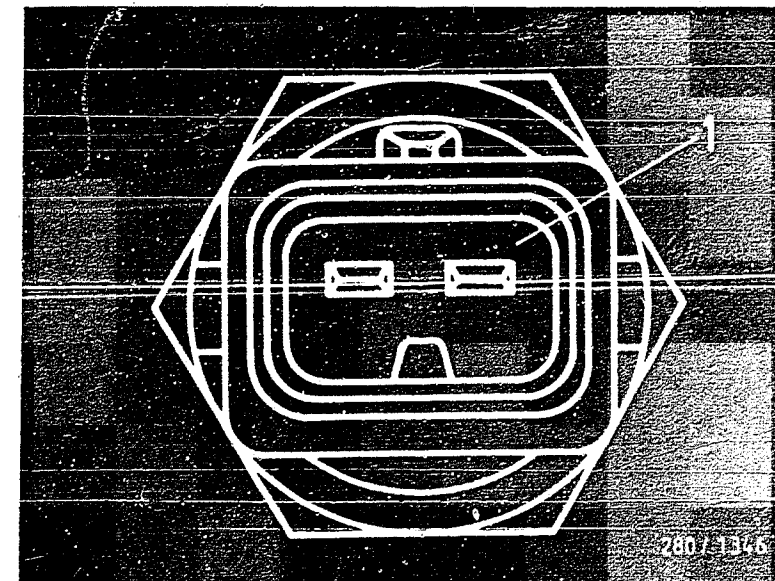
280...360 Ω

If set values are not attained, replace temperature sensor.

Check following leads for continuity with ohmmeter,
set value approx. 0 Ω :

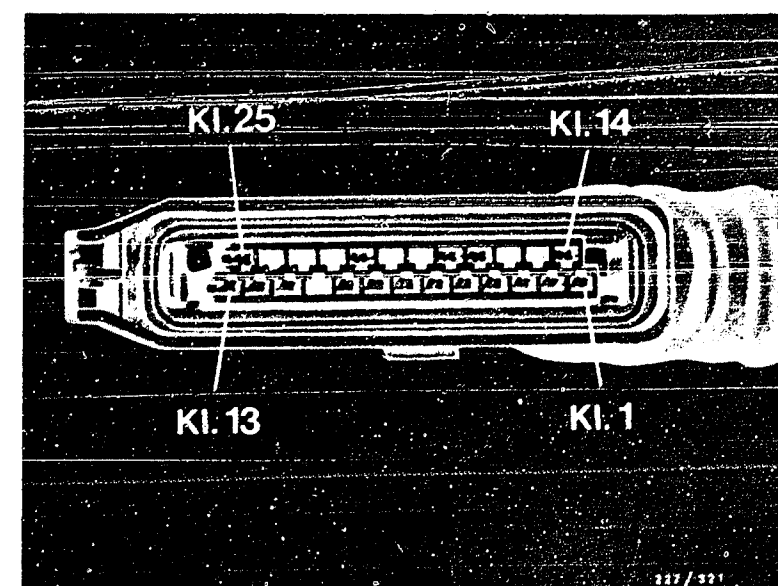
- * From control-unit plug term.2 to temperature sensor (engine).
- * From control-unit plug term.5 to temperature sensor (engine).

Eliminate open circuits/
contact resistances.



Top view of connector of engine-temperature sensor

Top view of control-unit plug



Continued on next picture page

TEST STEP 17

(TEST SPECIFICATIONS AND NOTES ON OPERATION)

Component/function:

Ground connection of output stage.

N>

* Operation:	Position
Progr. switch "V"	=>
Progr. switch "Ω"	13
Test button	—

* Measuring equipment
Motortester or multimeter

* Measuring range:
x 10 Ω

* Connection:
Blue test sockets, ohm

* Operation in vehicle:
Not applicable

* Set value:
0...10 Ω

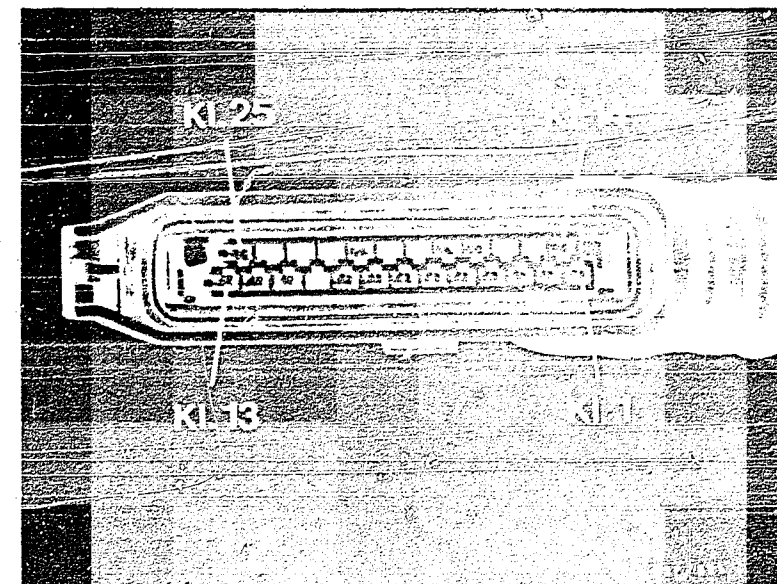
Is measured value within
set-value tolerance?

Trouble-shooting:

For testing, disconnect control-unit plug.

Check the following leads
for continuity with ohmmeter,
set value approx. 0 Ω :

- * From control-unit plug
term. 25 to vehicle ground.
- * From control-unit plug
term. 5 to vehicle ground.
Eliminate open circuits/
contact resistances.



Top view of control-unit plug

Continued on next picture page

TEST STEP 18

(TEST SPECIFICATIONS AND NOTES ON OPERATION)

Component/function:

Resistance of solenoid-operated injection valve

N>

* Operation:	Position
Prog.-sel. switch " V "	=>
Prog.-sel. switch " Ω "	14
Test button	—

* Measuring equipment
Motortester or multi-meter

* Measuring range:
x 100 Ω

* Connection:
Measuring sockets, ohms, blue

* Operation in vehicle:
not applicable

* Set value:
6...12 Ω

Measured value within set-value tolerance?

Trouble-shooting:

For testing, detach control-unit plug from test adapter.

Measure resistance value directly at multiple plug of solenoid-operated injection valve.

Ambient temperature

+15°...30°C

Set value: 1.0...1.6 Ω

If set value is not attained, replace solenoid-operated injection valve. Refer to Coordinate A17

Measure resistance value directly at series resistor.

Ambient temperature

+15°...30°C

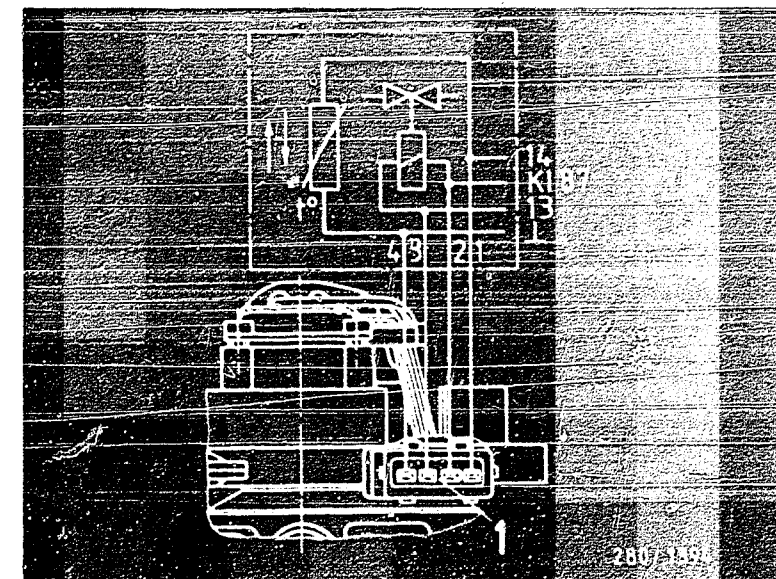
Set value: 2...4 Ω

If set value is not attained, replace series resistor.

Check following leads for continuity with ohmmeter,
set value approx. 0 Ω :

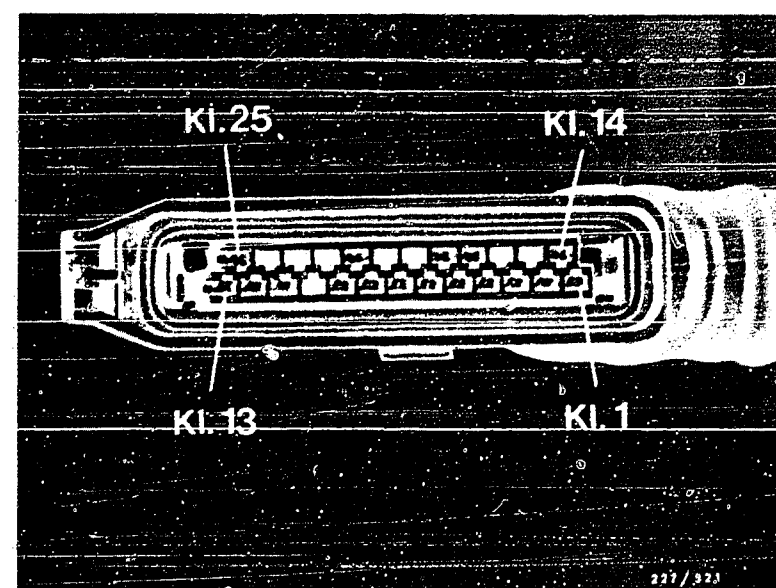
- * From control-unit plug term.13 to solenoid-operated injection valve.
- * From solenoid-operated injection valve to series resistor.
- * From series resistor to pump relay term.87.

Eliminate open circuits/contact resistances.



1 = Multiple plug of solenoid-operated injection valve and temperature sensor (intake air)

Top view of control-unit plug



Continued on next picture page

Component/function:Resistance of throttle-
valve potentiometer

N>

* Operation:	Position
Prog.-sel. switch " V "	=>
Prog.-sel. switch " Ω "	15
Test button	—

* Measuring equipment
Motortester or multi-
meter

* Measuring range:
x 100 Ω

* Connection:
Measuring sockets, ohms, blue

* Operation in vehicle:
not applicable

* Set value:
600...1300 Ω

Is measured value within
set-value tolerance?

Trouble-shooting:

For testing, detach control-
unit plug from test
adapter.

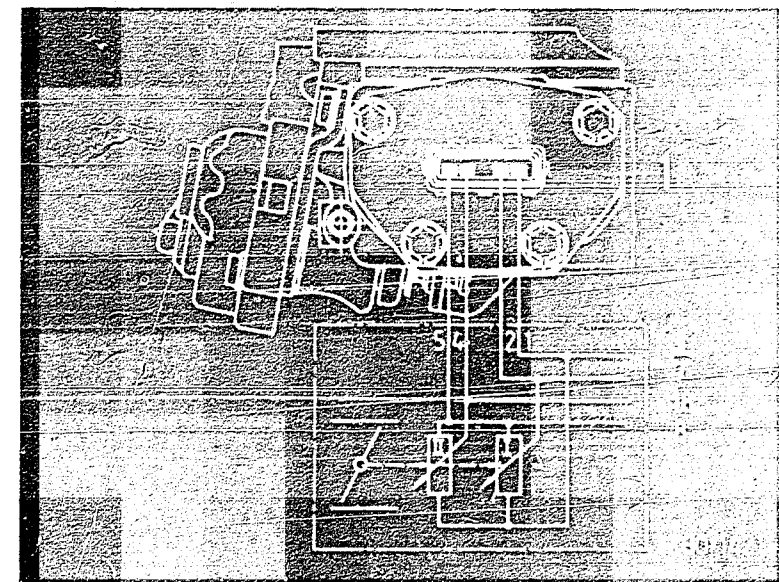
Measure resistance value
directly at throttle-valve po-
tentiometer term.5 and term.1.
Set value: 600...1300 Ω

If set value is not
obtained, replace complete
throttle-valve section.
Refer to Coordinate A19

Check following leads
for continuity with
ohmmeter,
set value approx. 0 Ω :

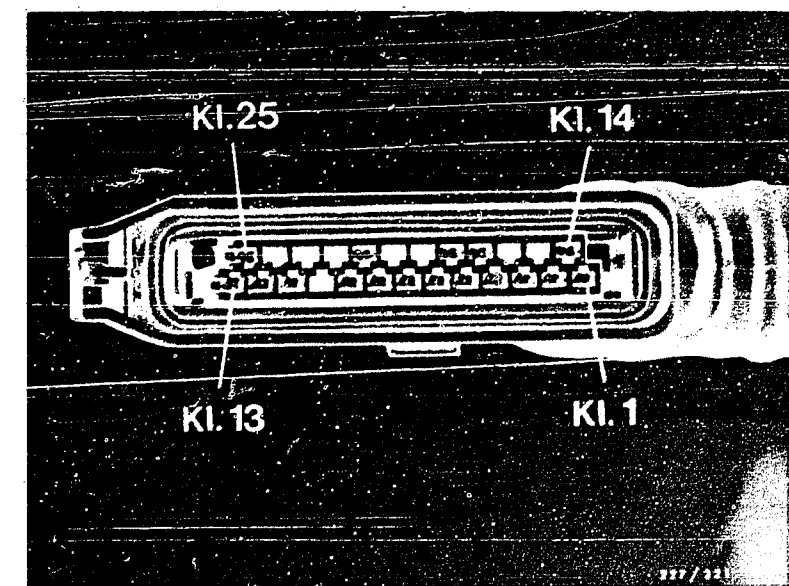
- * From control-unit plug
term.8 to throttle-valve
potentiometer term.5
- * From throttle-valve
potentiometer term.1 to
vehicle ground.

Eliminate open circuits/
contact resistances.



1 = Throttle-valve potentio-
meter

Top view of control-unit plug



Continued on next picture page

Component/function:Resistance of throttle-
valve potentiometer

N>

* Operation:	Position
Prog.-sel. switch " V "	==>
Prog.-sel. switch " Ω "	16
Test button	—

* Measuring equipment
Motortester or multi-
meter

* Measuring range:
x 100 Ω

* Connection:
Measuring sockets, ohms, blue

* Operation in vehicle:
Deflect throttle valve

* Set value:
500...4000 Ω
(Maximum value at part load)

Is measured value within
set-value tolerance?

Trouble-shooting:

For testing, detach control-
unit plug from test
adapter.

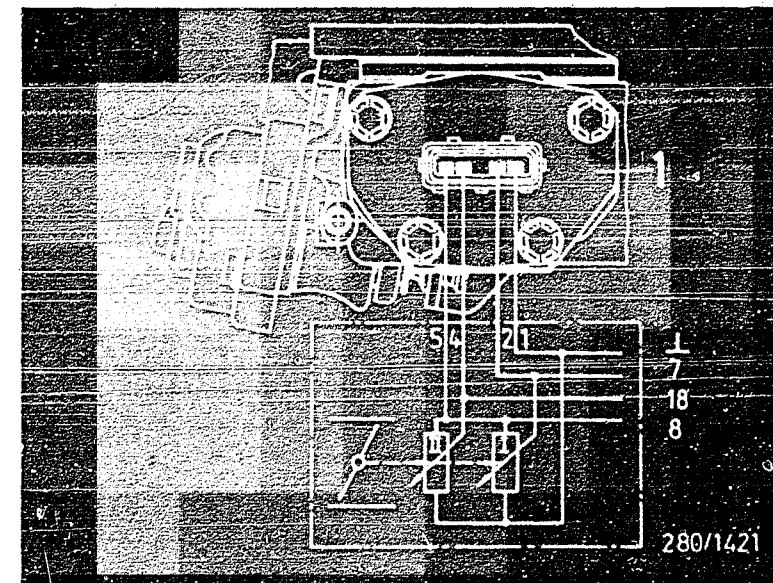
Measure resistance value
directly at throttle-valve
potentiometer term.2 and term.4.
Deflect throttle valve.
Set value: 500...4000 Ω
(Maximum value at part load).

If set value is not obtained,
replace complete throttle-
valve section.
Refer to Coordinate A19.

Check following leads
for continuity with
ohmmeter,
set value approx. 0 Ω :

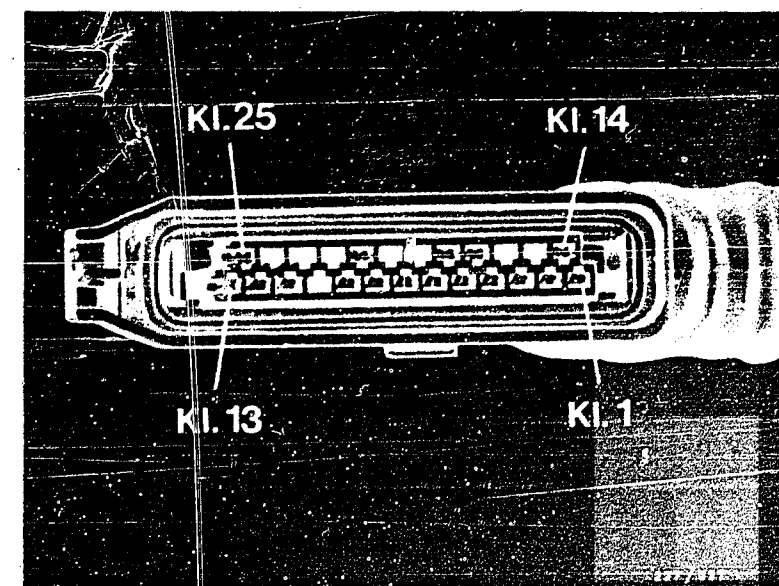
- * From control-unit plug
term.7 to throttle-valve
potentiometer term.2
- * From control-unit plug
term.18 to throttle-valve
potentiometer term.4

Eliminate open circuits/
contact resistances.



1 = Throttle-valve potentiometer

Top view of control-unit plug



Continued on next picture page

Component/function:Resistance of throttle-valve
idle adjuster

N>

* Operation	Position
Prog.-sel. switch " V "	=>
Prog.-sel. switch " Ω "	20
Test button	—

* Measuring equipment
Motortester or multimeter

* Measuring range:
x 100 Ω

* Connection:
Measuring sockets, ohms, blue

* Operation in vehicle:
not applicable

* Set value:
less than 250 Ω

Is measured value within
set-value tolerance?

Trouble-shooting:

For testing, detach control-
unit plug from test
adapter.

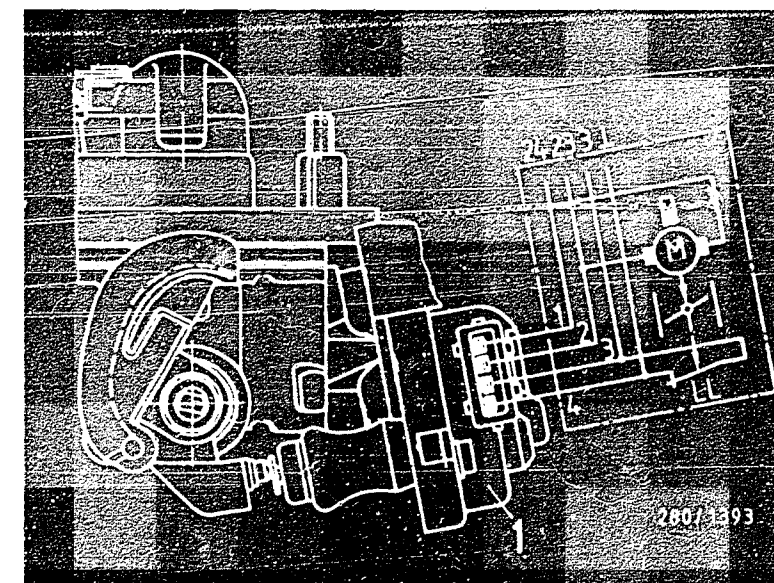
Measure resistance value
directly at throttle-valve
idle adjuster term.1 and
term.2.
Set value: less than 250 Ω

If set value is not
obtained, replace throttle-
valve idle adjuster.
Refer to Coordinate A19

Check following leads
for continuity with
ohmmeter,
set value approx. 0 Ω :

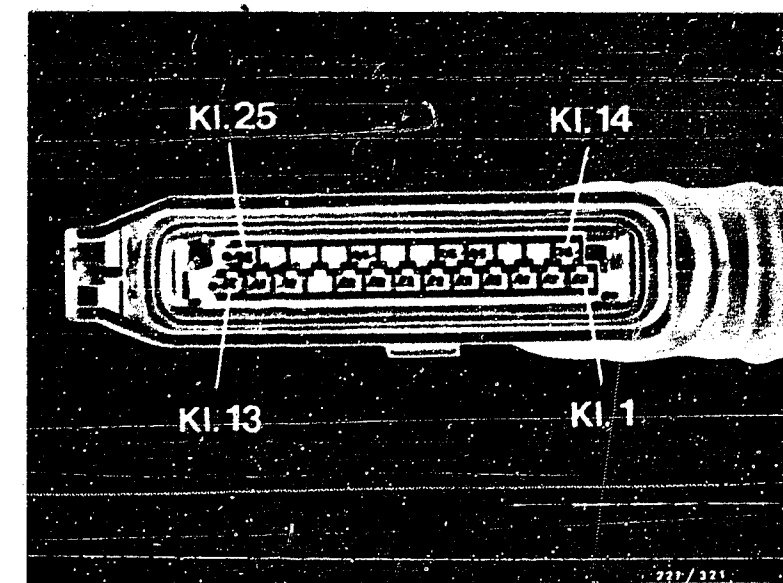
- * From control-unit plug
term.24 to throttle-valve
idle adjuster term.1
- * From control-unit plug
term.23 to throttle-valve
idle adjuster term.2

Eliminate open circuits/
contact resistances.



1 = Throttle-valve idle
adjuster

Top view of control-unit plug



Return to trouble-shooting chart
B03

TROUBLE-SHOOTING PROGRAM (1)

Check air-intake system

Are all hoses correctly connected, not kinked or damaged?
Is oil dipstick pressed all the way in? Is lid seal on oil filler neck O.K.?

Are all hoses O.K.?

Replace hoses if necessary.
Re-tighten hose binders.

Push in oil dipstick firmly.
Replace lid seal on oil filler neck.

Leakage test

Seal off exhaust tail pipe.

Detach hose from intake manifold and throttle-valve section and seal off.

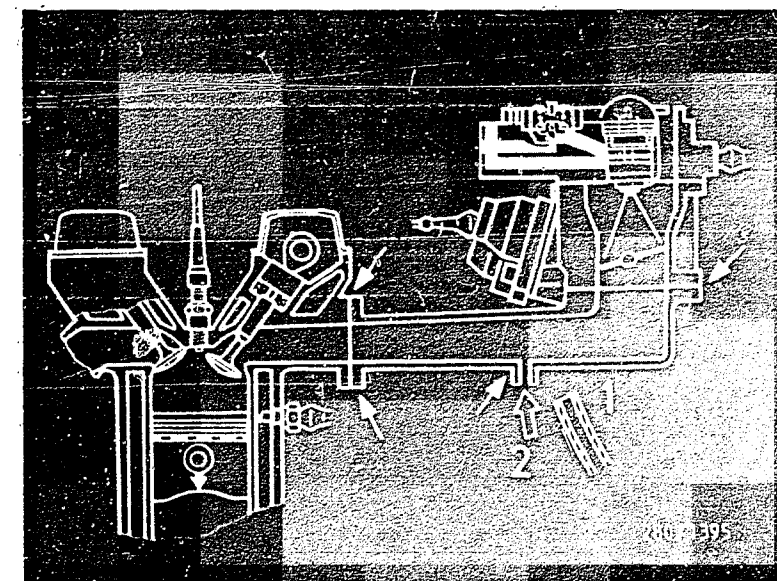
Using a compressed-air gun, blow air (0.3 bar gauge pressure) into the intake manifold. Spray or brush all joints with leak-detector spray or soapy water.

Are all joints leak-tight?

Bubbling or foaming indicates a leak.

Eliminate leaks by new seals or by re-tightening the hose binders.

Leaks may also occur at the following points:
Throttle-valve mounting, intake-manifold gasket as well as auxiliaries (e.g. brake booster) that work on intake-manifold pressure.



1 = Seal off
2 = Blow in air
Small arrows = Possible leakage points

Return to trouble-shooting chart B03

TROUBLE-SHOOTING PROGRAM (2)

Check fuel delivery.

Measure fuel delivery of electric fuel pump against pressure. Therefore, measuring point at return, after pressure regulator.

Disconnect fuel-return hose from throttle-body injection unit.

Attach test hose to return and lead into a 1.5 l measuring glass.

Detach pump relay.

Insert jumper into connection base (pump relay) between term.87 and term. 30.

(See lower illustration)

Measuring time 30 sec.

Fuel delivery at 12 V voltage
SET VALUE: see brief instructions
Set value obtained?

After testing is finished:

Remove jumper and connect pump relay in connection base.

Remove test hose and mount fuel return hose on pressure regulator. Make sure there are no leaks.

Return to trouble-shooting chart B03

N>

*Fuel filter very dirty, replace.

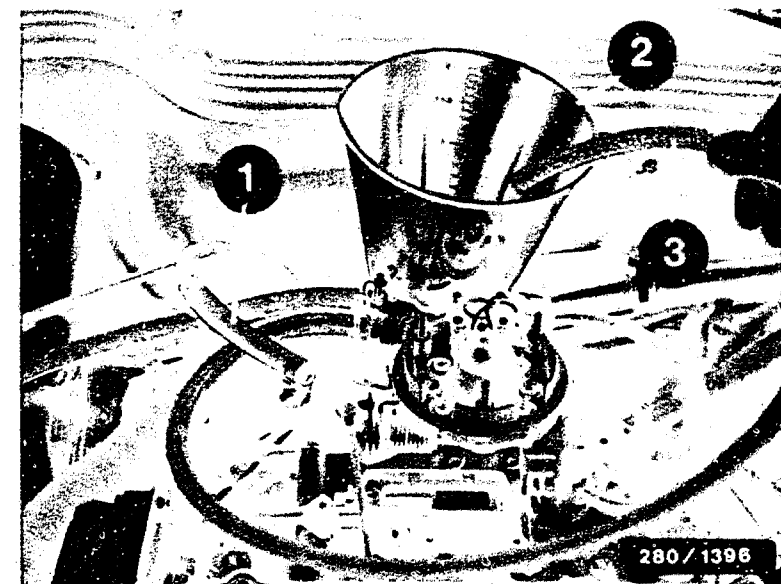
*Fuel delivery line clogged, replace.

*Voltage at electric fuel pump with engine running min. 12 V. If not, clean contacts, eliminate poor ground connection, replace leads.

*If fuel-pump delivery too low and fuel pressure O.K., replace electric fuel pump. Clean joints before loosening so that no dirt gets into the fuel system. In-tank electric fuel pumps are accessible via a closure on the tank.

*If electric fuel pump is loud (vapor locks) or intake line constricted, replace defective connections. Strainer in tank clogged, replace. Corrosion in tank, clean or replace.

*Pressure regulator defective, check fuel pressure.



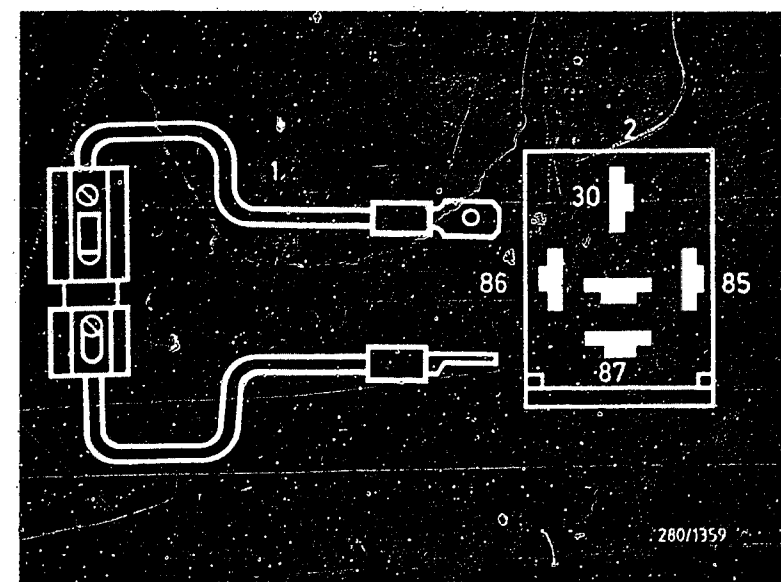
1 = Fuel return hose

2 = Measuring glass

3 = Test hose

1 = Jumper with fuse holder and 10 A fuse (user-fabricated)

2 = Top view of connection base



TROUBLE-SHOOTING PROGRAM (3)

Check fuel pressure with engine stopped.

Measure pressure before pressure regulator. Measuring point at inlet of throttle-body injection unit at hose connection or at fuel filter.

Loosen fuel-inlet hose.

CAUTION!

Catch escaping fuel; it must not get onto hot parts of the engine. Connect pressure gauge KDJE-P100/17 (1.6 bar) to hose.

To connect, use three-way line KDJE-P100/13 (hose connection). Make sure there are no leaks. Insert jumper into connection base (pump relay) between term.87 and term.30. Electric fuel pump running.

Fuel pressure

SET VALUE: see brief instructions

Set value obtained?

N>

SET VALUE NOT REACHED:

*S l o w l y pinch off fuel return hose.

Caution! Pressure must not rise above 2 bar. If pressure rises above 1.5 bar, pressure regulator is defective, replace hydraulic section of throttle-body injection unit. Refer to Coordinate A21

*Fuel filter very dirty, replace.

*Fuel delivery line or pressure damper (if fitted) clogged, replace.

*Strainer in tank clogged. Corrosion in tank.

SET VALUE EXCEEDED:

Loosen fuel return hose from throttle-body injection unit.

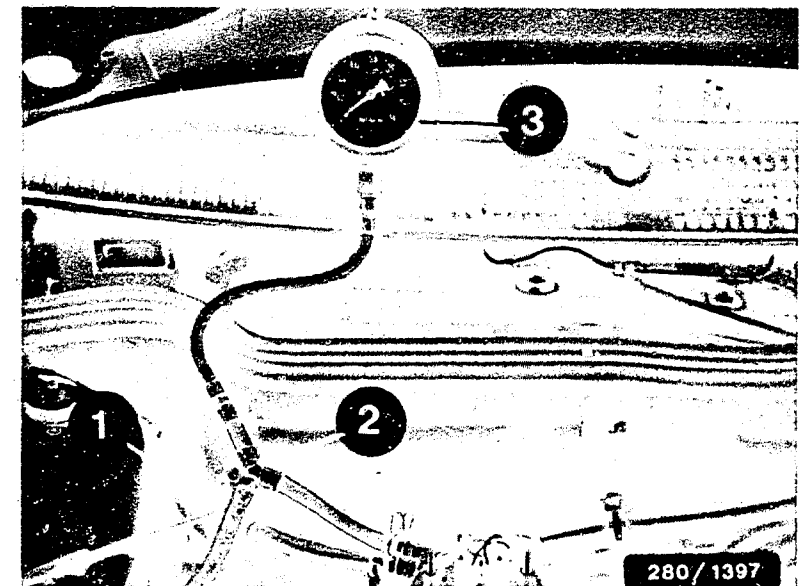
Attach test hose at fuel return and lead into a 1.5 l measuring glass.

Is set value now obtained?

*If yes, fuel return line clogged or pinched, replace.

*If not, pressure regulator defective, replace hydraulic section of throttle-body injection unit.

Refer to Coordinate A21



1 = Fuel inlet hose

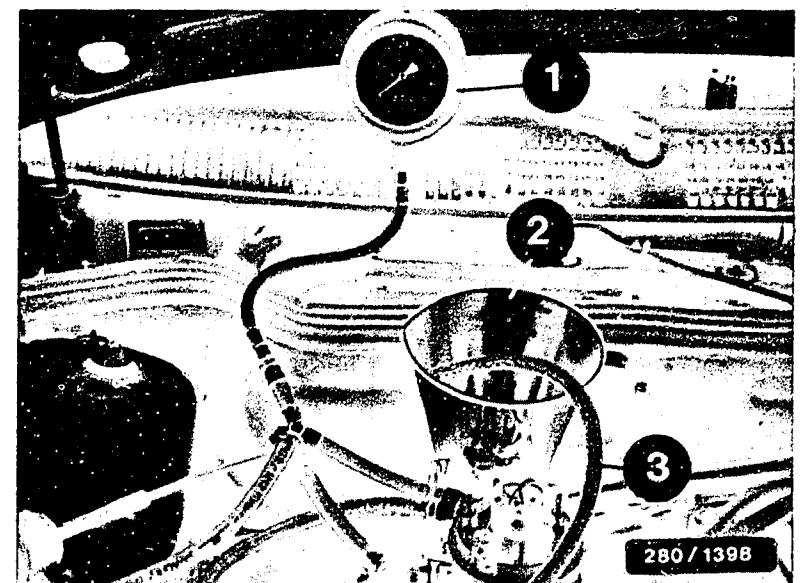
2 = Three-way line KDJE-P100/13

3 = Pressure gauge KDJE-P100/17

1 = Pressure gauge

2 = Measuring glass

3 = Test hose



Continued on next picture page

TROUBLE-SHOOTING PROGRAM (3) CONTINUED (1)

Check fuel system externally for leaks.

Insert jumper into connection base (pump relay) between term.87 and term.30.
Electric fuel pump running.

There must be no escape of fuel to the outside (visual check).

Set value obtained?

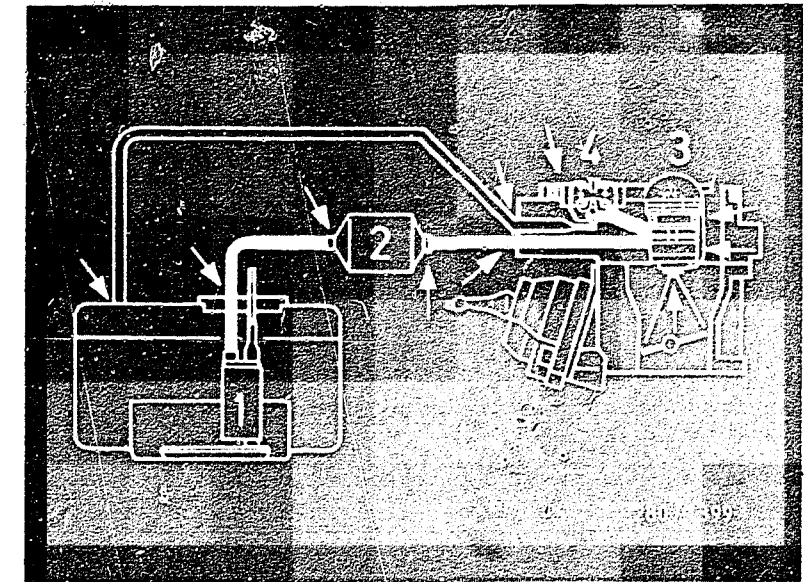
N>

*Joints between components, fuel hoses and lines leaking, tighten hose band clips, or replace hose.

*Pressure regulator leaking at diaphragm, replace hydraulic section of throttle-body injection unit.
Refer to Coordinate A21

*Injection valve leaking at upper or lower O-ring, replace O-rings.
Refer to Coordinate A17

*Pressure damper or fuel filter leaking, replace.



1 = Electric fuel pump
2 = Fuel filter
3 = Injection valve
4 = Pressure regulator

Arrows = possible leakage points

Check injection valve (ball seat) for leakage:

Insert jumper into connection base (pump relay) between term.87 and term.30. Electric fuel pump running.

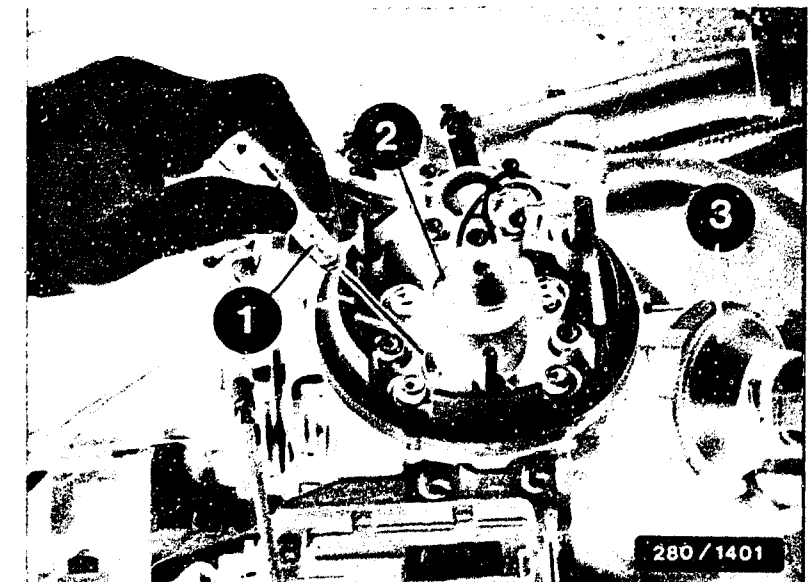
Set value:
Within 60 sec., max. one drop of fuel may drip from injection valve.
(Visual test with hand lamp and small inspection mirror.

Set value obtained?

N>

Replace injection valve.
Refer to Coordinate A17

1 = Inspection mirror
2 = Injection valve
3 = Hand lamp



280 / 1401

Continued on next picture page

TROUBLE-SHOOTING PROGRAM (3) CONTINUED (2)

Check fuel system for internal leaks.

Leave pressure gauge connected at inlet as well as test hose at return.

Insert jumper into connection base (pump relay) between term.87 and term.30.
Electric fuel pump running.

Remove jumper.

Set value:
Fuel pressure remains constant.

Set value obtained?

N>

Pinch off test hose.

Insert jumper only very briefly.

Caution:
Do not allow fuel pressure to increase above approx. 1.5 bar.

Set value:
Fuel pressure remains virtually constant.

If set value is not obtained,
non-return valve of electric
fuel pump is leaking.

If non-return valve is screw-in
type, replace.

If non-return valve is fixed,
replace electric fuel
pump.

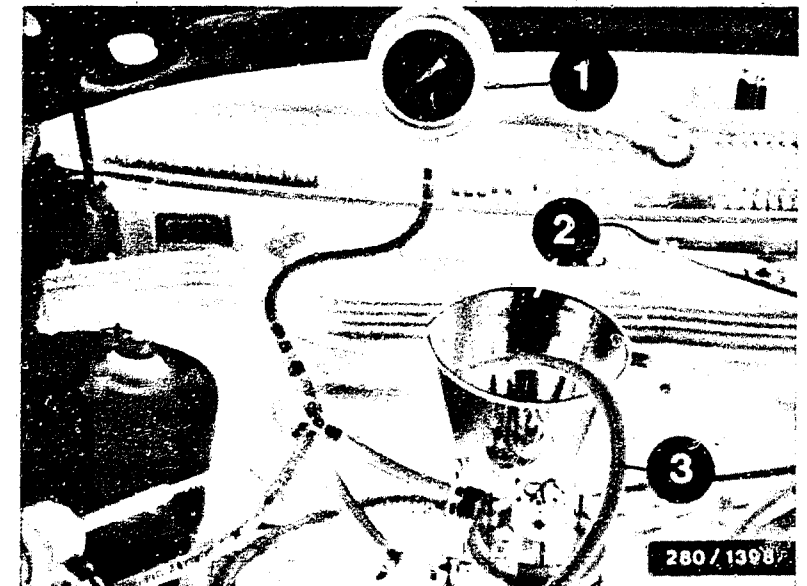
After testing is finished:

Insert pump relay in
connection base.

Dismantle pressure gauge and
test hose.
Mount fuel-inlet and
fuel-return hoses on tail
pieces of throttle-body
injection unit.

Make sure there are no leaks.

Return to trouble-shooting chart
B03



- 1 = Pressure gauge
- 2 = Measuring glass
- 3 = Test hose

TROUBLE-SHOOTING PROGRAM (4)

Check solenoid-operated injection valve with engine running

Connect motortester as for ignition-point measurement.

Let engine run.

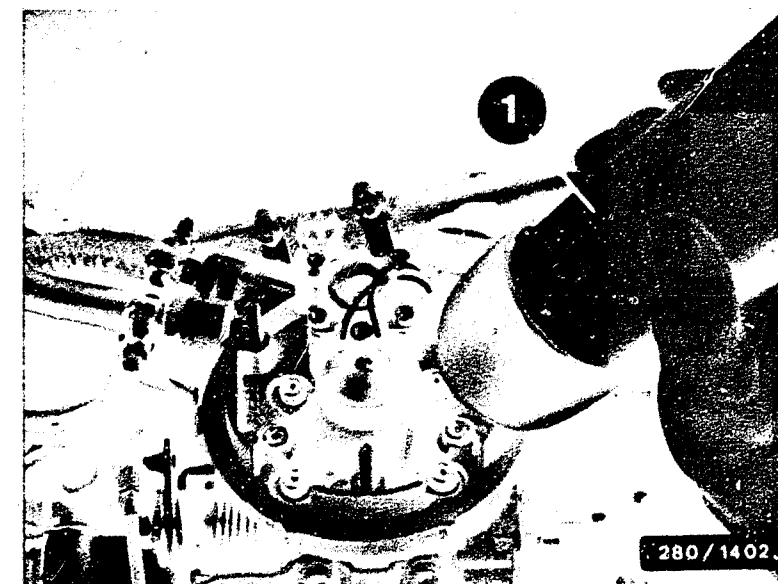
Flash throttle-valve with timing light. Turn adjusting wheel until injection cone is visible.

Set value: injection cone should have good spray formation and atomization in entire range.

Set value obtained?

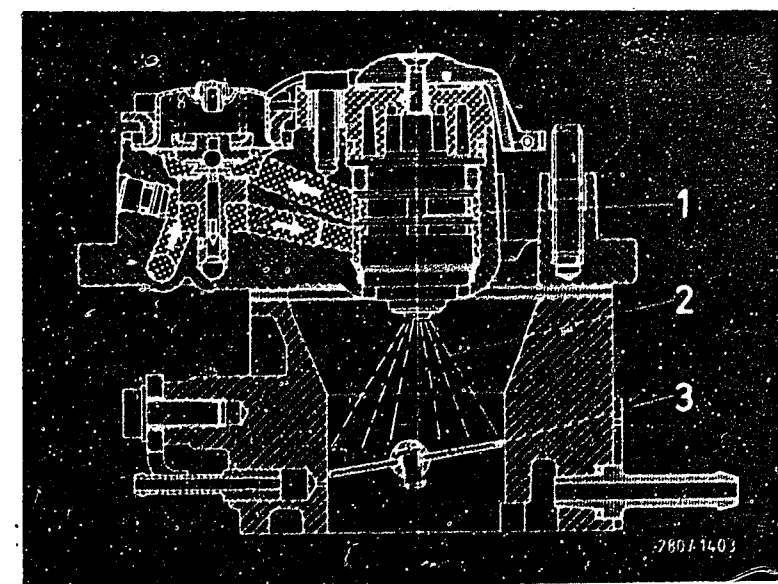
N>

Replace injection valve. Refer to Coordinate A17



1 = Timing light

- 1 = Solenoid-operated injection valv
- 2 = Injection cone
- 3 = Throttle valve



Return to trouble-shooting chart B03

D01

<=>

D02

<=>

TROUBLE-SHOOTING PROGRAM (5)

Check interference and missing.

Connect motortester (special input) to solenoid-operated injection valve.
Black clamp to vehicle ground.
Push back rubber sleeve on inserted multiple plug.

Connect red clamp via test lead KDZS 0004 (see upper illustration).

Let engine run.

If correctly connected, injection pulses will be visible on the oscilloscope (diagram opposite).

Set value: injection pulses

Set value obtained?

Detach test lead(s) KDZS 0004 and push on rubber sleeve on multiple plug. Disconnect motortester.

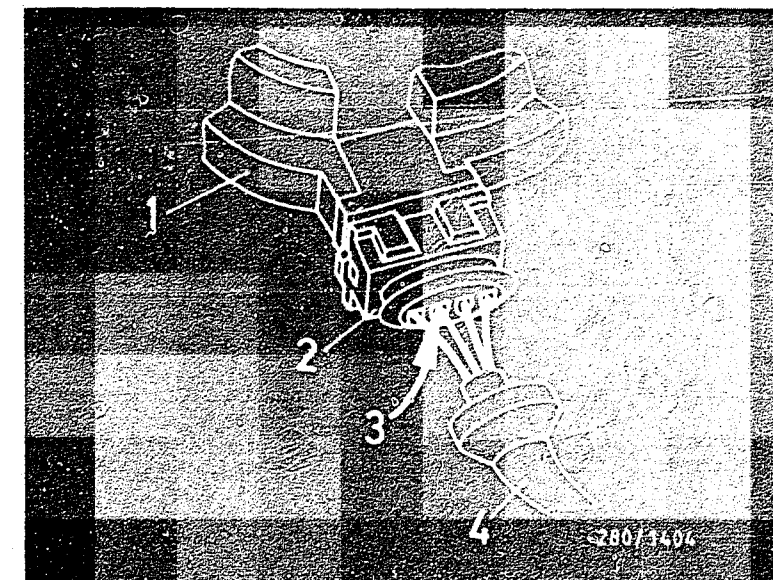
Return to trouble-shooting chart B03

Check connections and/or pay attention to good contact.

In the event of interference, check the cable installation, i. e. route ignition leads separately from the wiring harness.

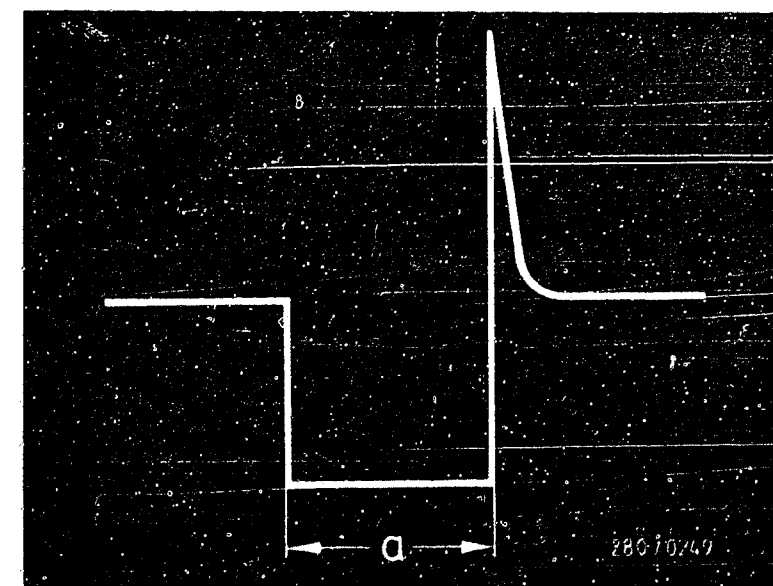
Other disturbances may be caused by the generator, radio or interference suppressor boxes for example.

In the event of misfiring, check all electrical plug connections, particularly positive supply, ground connection and ignition signal term.1.



- 1 = Hydraulic section
- 2 = Multiple plug
- 3 = Test connection
- 4 = Rubber sleeve

Injection pulses of a switched output stage (measured at the injection valve)
a = Pulse length (dependent on engine load)



TROUBLE-SHOOTING PROGRAM (6)

V

Check start control.

Detach ignition cable term.4
from ignition distributor
cap and connect to vehicle
ground with spark gap.
Engine must not start.

Caution:

Connect an interference-
suppression resistor of min.
2 k Ω between spark gap and
ignition coil term.4, e.g.
sleeve-type suppressor (5 k Ω)
0 356 500 001.

Push back rubber sleeve on
inserted multiple plug. Connect
multimeter via measuring leads
KDZS 0004.

(See upper illustration).

Measuring range approx. 10 V

Detach cable plug from
temperature sensor (engine)
and connect 10 k Ω resistance,
e.g. temperature sensor
0 280 130 028
(at 15°C...30°C) 10 k Ω

Start engine.

Set value: voltage drops from
initially greater than 1.0 V
within approx 15 sec. starting
time to approx 0.3 V.

Start-repeat time longer
than 1 minute.

Set value obtained?

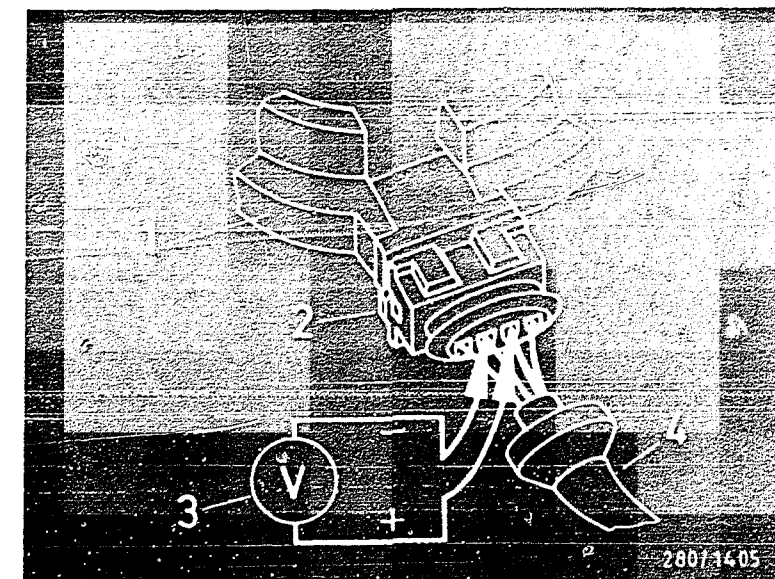
V

V

Continued on next picture page

N>

If voltage values not obtained
=> replace control unit.



- 1 = Hydraulic section
- 2 = Multiple plug
- 3 = Measurement arrangement
- 4 = Rubber sleeve

TROUBLE-SHOOTING PROGRAM (6) CONTINUED (1)

V

Detach test lead(s) KDZS 0004
and push on rubber sleeve
on multiple plug. Disconnect
motortester.

Y

V

Return to trouble-shooting chart
B03

TROUBLE-SHOOTING PROGRAM (7)

Check overrun cutoff.

Connect motortester (special input) to solenoid-operated injection valve.
Black clamp to vehicle ground.

Push back rubber sleeve on inserted multiple plug.
Connect red clamp via test lead KDZS 0004 (see upper illustration).

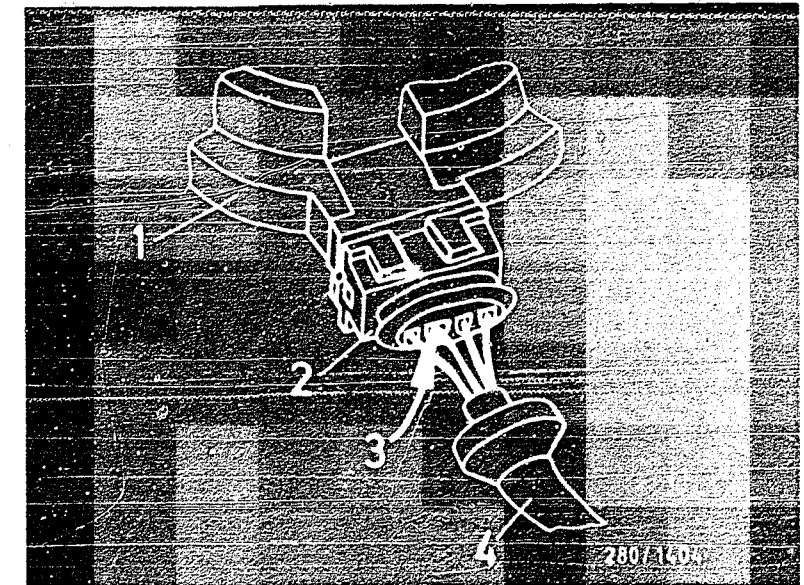
Let engine run.

If correctly connected, injection pulses are visible on the oscilloscope (diagram opposite).

Set value: injection pulses

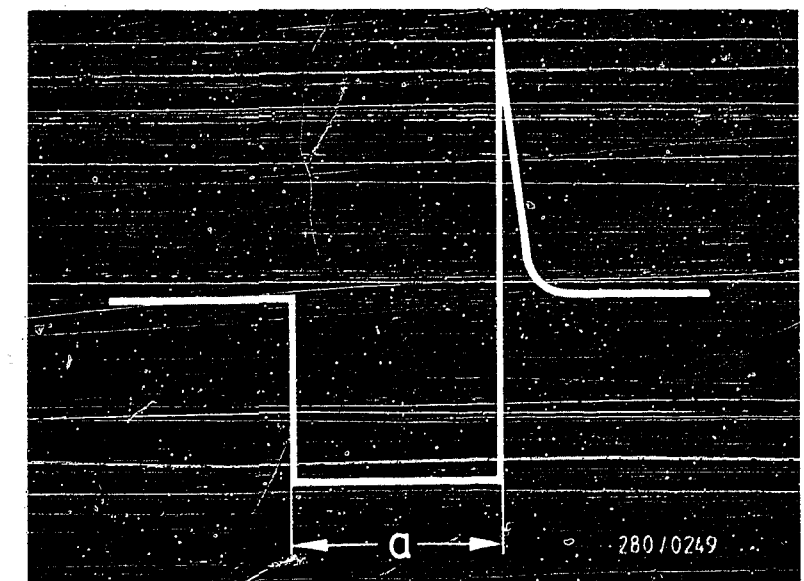
Set value obtained?

Check connections and/or pay attention to good contact.



- 1 = Hydraulic section
- 2 = Multiple plug
- 3 = Test connection
- 4 = Rubber sleeve

Injection pulses of a switched output stage (measured at the injection valve)
a = Pulse length (dependent on engine load)



Continued on next picture page

TROUBLE-SHOOTING PROGRAM (7) CONTINUED (1)

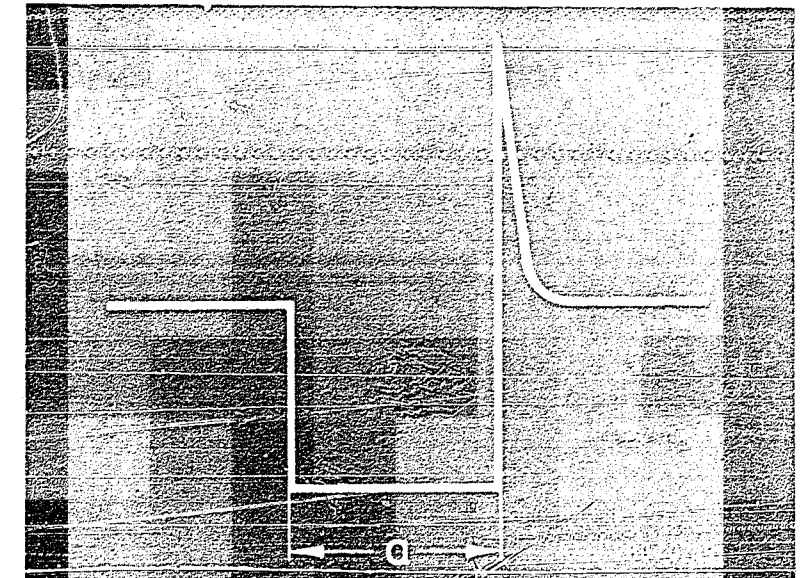
Slowly increase engine speed to approx. 3000 min⁻¹. Injection pulses visible on oscilloscope.
Drop back engine to idle speed.
Set value: no injection pulses.

Reinstatement:
Shortly before idle speed is reached, injection pulses must be visible.
Set value: injection pulses

Is set value obtained?

Make sure that the idle switch is in proper working order.

If the idle switch is in working order, replace control unit.



Injection pulses of a switched output stage (measured at the injection valve)
a = Pulse length (dependent on engine load)

Detach test lead(s) KDZS 0004 and push on rubber sleeve on multiple plug. Disconnect motortester.

Return to trouble-shooting chart B03

TROUBLE-SHOOTING PROGRAM (8)

Check idle speed

Requirement:

*Air-intake system is leak-tight.

*Air filter not clogged.

*Throttle-plate lever is in contact with stop plate of idle switch.

*Accelerator cable or linkage is adjusted to be free of tension.

*Ignition and valve gear in working order.

* Engine at operating temp., approx. + 80° C

* Switch off air conditioner (if fitted).

Set value: see brief instructions

Is set value obtained?

N>

Make sure that the idle switch is in proper working order.

If idle switch is in working order, check operation of throttle-valve idle adjuster.

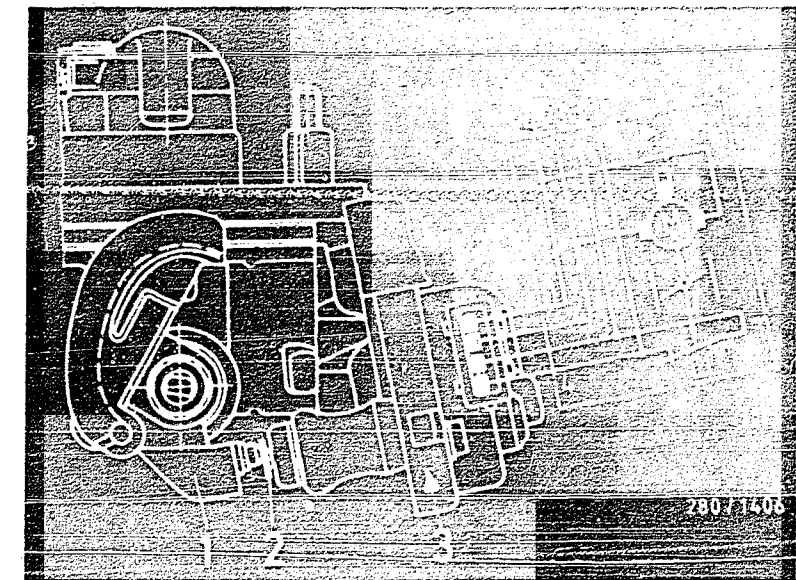
Detach cable plug from temperature sensor (engine) and connect 10k Ω resistance, e.g. temperature sensor 0 280 130 028 (at +15...+30°C) 10k Ω

Ignition "ON"

Idle adjuster must deflect the throttle valve.

If not, replace control unit.

Insert cable plug in temperature sensor (engine) again.



- 1 = Throttle-plate lever
- 2 = Stop plate of idle adjuster
- 3 = Throttle-valve idle switch

Check CO concentration.

As a result of the adaptive lambda closed-loop control CO adjustment is not necessary.

In the event of idling problems, see next micropicture.

Return to trouble-shooting chart B03

TROUBLE-SHOOTING PROGRAM (9)

Check lambda sensor.

Engine at operating, temperature, lambda sensor must be heated to correct temp. Idle speed O.K.

To check the sensor signal, disconnect lambda-sensor plug. Measure voltage on sensor side with digital multimeter (Ri greater than 1M Ω) to ground.

Voltage must increase when accelerator is pressed.

Set value: 0.6...1.0 V

Set value obtained?

N>

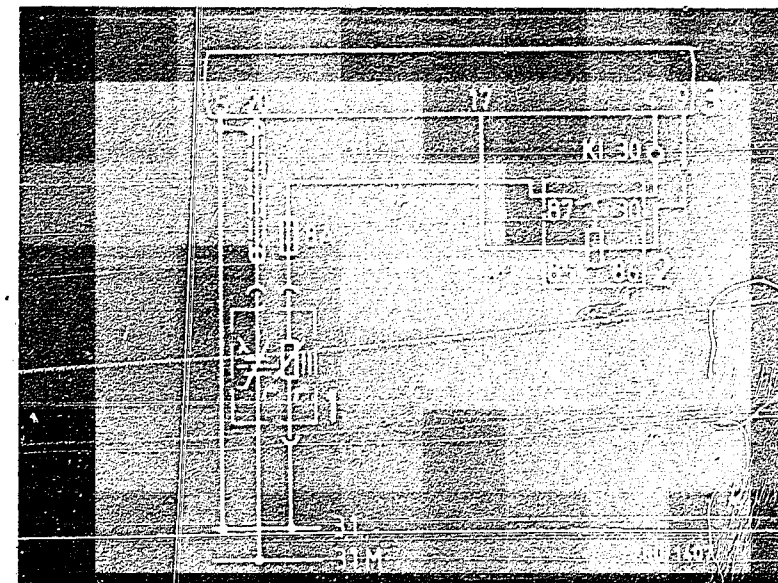
Check sensor heater (if fitted).

Check following leads for continuity with ohmmeter, set value approx. 0 Ω :

- * From heater plug to pump relay term.87
- * From heater plug to vehicle ground.
- * From sensor housing to vehicle ground.

If leads are O.K., replace lambda sensor.

When fitting a new sensor, use grease Vs 140 16 Ft.



- 1 = Heated lambda sensor
- 2 = electric-fuel pump relay
- 3 = Control-Unit plug

Continued on next picture page

TROUBLE-SHOOTING PROGRAM (9) CONTINUED (1)

Check lambda closed-loop control
(control-unit functions)

Engine at operating temperature

Detach lambda-sensor plug.
Measure sensor voltage with
digital multimeter at sensor
lead (+) and vehicle
ground (-).
Let engine run.

Simulation lean mixture:
connect lead on control-unit
side to ground.
Sensor voltage must rise.
Set value: 0.6...1.0 V

Simulation rich mixture:
connect lead 1.5...2.0 V
on control-unit side.
Sensor voltage must drop.
Set value: 0.05...0.3 V

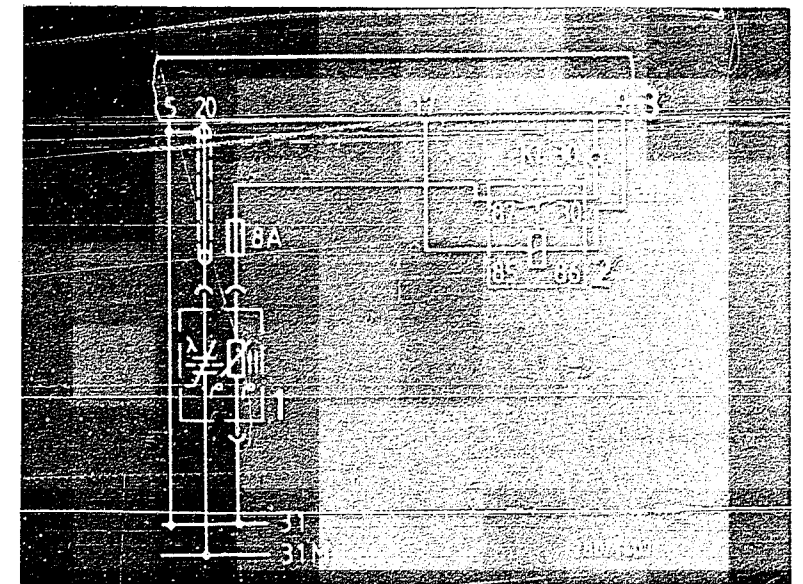
Set value obtained?

N>

Check following lead for
continuity with ohmmeter,
set value approx. 0 Ω ;
From control-unit plug
term.20 to sensor plug.

Check following lead for
insulation with ohmmeter,
set value greater than 1 M Ω
From control-unit plug term.20
to vehicle ground.

If set value is not obtained,
replace control unit.



- 1 = Heated lambda sensor
- 2 = electric-fuel pump relay
- 3 = Control-Unit plug

Disconnect digital multimeter
and plug together sensor plug.

As a result of the adaptive
lambda closed-loop control,
adjustment of the lambda
closed-loop control customary
with other systems (LU-Jetronic)
is not necessary.

Take vehicle on test run.

Return to trouble-shooting chart
B03

TROUBLE-SHOOTING PROGRAM (10)

V

Check exhaust-gas cat. converter.

Engine at operating temperature.

Separate lambda-sensor plug (control) and measure CO concentration downstream of cat. converter. Make a note of the value.

Unscrew lambda sensor and measure CO concentration upstream of cat. converter in sensor hole. Use own-fabrication adapter for exhaust-gas sampling (thread M 18 x 1.5). Make a note of the value.

Set value: CO concentration downstream of catalytic converter must be considerably lower.

Set value obtained?

N>

If both values are almost the same, the catalytic converter is clogged (leaded fuel has been used) and must be replaced.

V

Return to trouble-shooting chart B03

D19

<==>

D20

<==>

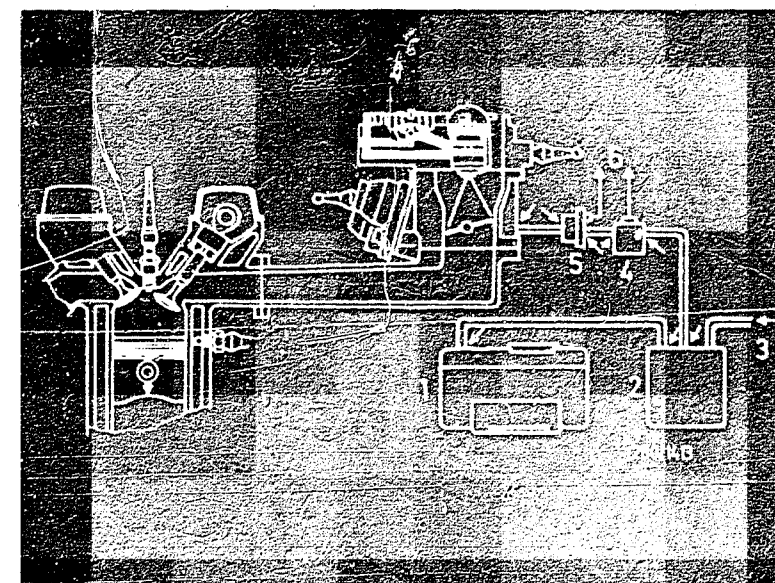
TROUBLE-SHOOTING PROGRAM (11)

Check tank-ventilation system.

Check visually whether hoses of tank-ventilation system are correctly attached, not bent or damaged.
Check whether hose connections at intake manifold, tank bleeder valve, active-carbon canister and fuel tank are leak-tight.

Are all hoses and connections O.K.?

Replace defective hoses as necessary.
Eliminate leakages by tightening hose clamps.



- 1 = Fuel tank
- 2 = Activated-carbon canister
- 3 = Air supply
- 4 = Solenoid-operated valve
- 5 = Tank-ventilation valve
- 6 = Electrical connections

Arrows = possible leakage points

Continued on next picture page

TROUBLE-SHOOTING PROGRAM (11) CONTINUED (1)

Connect the two-pole test lead 1 684 463 093 between tank-ventilation valve and its connector.

Connect motortester (special input) to test lead.
Black clamp to vehicle ground.
Connect red clamp to one of the two connections of the test lead.

Caution: the free terminal of the test lead must not come into contact with ground.

Let engine run.

If correctly connected, pulses are visible on the oscilloscope (diagram opposite). The on/off ratio of the pulses is dependent on engine speed and load.

Set value: pulses

Is set value obtained?

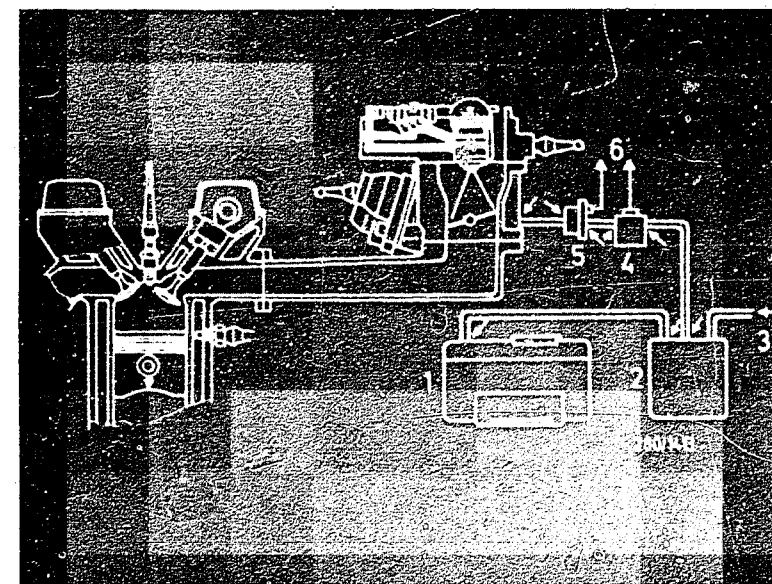
N>

Check connections.
Connect the red clamp from the motortester to the other connection of the test lead.

The free connection must not come into contact with ground.

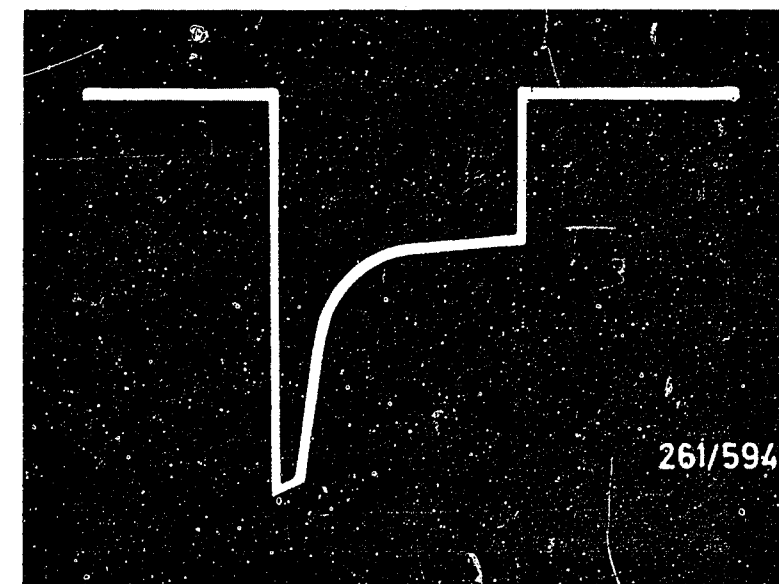
If no pulses are visible, check connector and supply lead to control unit.

If connector and leads are O.K., replace control unit.



- 1 = Fuel tank
- 2 = Activated-carbon canister
- 3 = Air supply
- 4 = Solenoid-operated valve
- 5 = Tank-ventilation valve
- 6 = Electrical connections

Arrows = possible leakage points



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